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Canada's Energy Policy, 1985 and Beyond

Edward A. Carmichael
Corina M. Herrera

Editors

C.D. Howe Institute

Foreword

In 1985 Canadian governments will seek new agreements on energy pricing and taxation. These negotiations will replace the temporary compromise that was worked out over the National Energy Program in 1983. The context for the 1985 negotiations will be one of uncertainty about future trends in international energy markets. Current softness in world oil prices could continue, but serious disruptions are also a distinct possibility.

How should Canada's future energy policy be framed to allow for these uncertainties? The C.D. Howe Institute invited a distinguished group of Canada's experts to address this question in a symposium held in late 1983. Participants included a cross section of policymakers, producers, consumers, and analysts. The major papers presented at the symposium are published in this volume as a contribution to a framework for dealing with the issues involved in formulating a national energy policy for the late 1980s.

In its overview chapter, the Institute asks the question, Why does Canada require an energy policy? We believe it is useful to answer this question because many analysts and policymakers now conclude that deregulated petroleum prices should be a cornerstone of any new policy. We agree that the market provides the most efficient and flexible price-setting mechanism.

It is important to realize, however, that the market has limitations in responding to price and supply shocks, in dealing with risk, and in redistributing revenues, and that the Canadian Constitution affects the way energy resources are managed. An energy policy is still required to deal with these constraints. As the contributions in this volume make clear, however, the policy and the process by which it is formulated must have flexibility to allow appropriate and timely adaptation to abrupt changes in international markets.

This volume was edited by Ted Carmichael, Senior Policy Analyst, and Cory Herrera, Policy Analyst. Institute staff consulted with, among others, members of the Institute's Western Regional Committee. Barry Norris prepared the manuscript for publication. The views expressed are those of the authors and of the Institute's staff and do not necessarily represent the opinions of the members of the Institute.

Dr. Wendy Dobson
Executive Director
September 1984

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Toward More Flexible Energy Policy

Edward A. Carmichael and Corina M. Herrera

Canada's energy policy has been in an unpredictable state of flux for much of the last decade. The uncertainty generated by policy changes — both the dramatic type unveiled in the 1980 National Energy Program (NEP) and the ensuing piecemeal revisions reacting to unanticipated changes in world energy markets — have plagued energy producers and consumers alike. This uncertainty has often been made worse by the fractious process of energy policy formulation that pits producing provinces against the federal government.

In the past, Canada may have been able to afford the luxury of indulging in internal disputes and living with uncertainty because the economy was performing well and Canadian resource wealth provided an easy route to higher living standards. Generating economic growth, however, has become much more difficult in the 1980s. The turbulent international economic environment means that all sectors of the Canadian economy must adapt quickly to change if we are to be efficient and competitive.

The contributions to this volume clearly indicate that energy policy in the 1980s must be formulated in the context of a difficult and often unpredictable international environment and that it must be consistent with Canada's broader economic objectives and policies. This introductory chapter provides an overview of issues that Canadians face in developing a realistic energy policy for the late 1980s. Views of a distinguished group of energy policy analysts are presented in subsequent chapters. Their papers were prepared for a symposium sponsored by the C.D. Howe Institute in late 1983.

This overview begins by exploring the implications of placing energy policy within a broader economic context. This leads to the view, expressed by symposium participants, that much greater reliance on market-determined energy prices is required if energy policy is to achieve

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its fundamental objectives. In spite of the need for less regulation of energy prices, however, Canada requires an energy policy to improve upon market outcomes and to achieve several other policy objectives. To address these objectives, the paper evaluates options for taxation and revenue sharing, for dealing with future energy supply or price shocks, and for providing exploration and development incentives. The concluding section raises the major issues that will face policymakers as they attempt to formulate a more flexible energy policy for Canada after 1985.

The International Context

In the decade since the oil shock of 1973-74, the world economy has been forced through a wrenching adjustment to higher energy prices. This forced adjustment has slowed economic growth in oil-consuming nations both because of the huge transfer of wealth to oil-producing nations and because of the need to invest in energy conservation rather than in expanded production.

Many countries that produce no oil, such as Japan and most of Europe, had no choice but to adapt quickly to higher energy prices. Other countries that produce a large proportion of the energy they use, such as the United States and Canada, chose to reduce the disruptive impact of higher energy prices by holding domestic oil prices below world levels. In Canada, lower energy prices provided a temporary competitive advantage for energy-using industries, but only at the expense of postponing the adjustment to more efficient energy use that was dictated by the new realities of the world energy market. When Canada finally did begin to move rapidly toward the world price of oil in 1981 and 1982, the adjustment could not have come at a worse time. Large oil price increases pushed up the general price level, kept inflation high, increased the degree of restraint needed to break the momentum of inflation, and thereby contributed to making the recent recession the worst since the Great Depression of the 1930s.

Morris Adelman of the Massachusetts Institute of Technology, the first contributor to this volume, cogently argues that the most likely prospect for the world oil market is continued instability in price and supply.[1] He argues that it is impossible to ascribe the current price of oil to the competitive forces of demand and supply. On the demand side, heavy investment has brought about a dramatic reduction in energy in-

[1]M.A. Adelman, "The International Context," in this volume.

tensity — the amount of energy consumed per unit of production. On the supply side, the Organization of Petroleum Exporting Countries (OPEC) cartel continues to grope towards managing a combination of world oil supply and pricing that will maximize its long-term revenues. The result has been that growing excess capacity now overhangs the world oil market.

Future oil prices depend heavily upon whether OPEC will be successful in coping with this excess capacity or will run into difficulty in coordinating the production of its member nations. If OPEC continues to hold together, potential wars or destabilizing revolutions could still create another oil shock. If OPEC's discipline fails, a sharp drop in oil prices cannot be ruled out. Oil-consuming nations, including Canada, would be wise to develop domestic energy policies that equip them to deal with either eventuality.

The Domestic Policy Context

Energy policy must also be placed within the context of Canada's broader economic objectives and the policies that are being adopted to achieve them. Economic policies are geared to foster a steady recovery and reduced unemployment without reigniting inflationary pressures. This means monetary policy will be conservative; fiscal policy will steadily reduce government deficits as the recovery proceeds; and industrial and labor market policies will promote improved productivity, competitiveness, and flexibility in the Canadian economy.

It was a lack of flexibility in adjusting expectations and policies in response to the new international environment that made Canada's recent recession more severe than that experienced in other industrial nations. The complex regulations controlling energy pricing and taxation that emanated from highly contentious federal-provincial negotiations following the NEP were one important and costly source of this inflexibility.

Developing an energy policy to cope with an uncertain environment will require that the policymaking process itself become more open and flexible. As Thomas Kierans, President of the investment firm McLeod Young Weir Ltd., notes in his paper in this volume, "If we are to achieve a legitimate consensus, we must ensure that the changes that occur in Canadian energy policy take the views of all interested parties into consideration."[2]

[2]Thomas E. Kierans, "Energy Issues in a Public Policy Context," in this volume.

The key objective of Canadian energy policy — viewed within this context of an uncertain world energy environment and domestic economic policy objectives — is to provide a pricing, taxation, and regulatory framework that promotes timely adoption of the most efficient techniques for the development, production, and use of energy in Canada. Energy policy should promote efficiency by ensuring that Canada's lowest-cost energy sources are developed first; by permitting energy users to face prices that reflect the economic cost of production (or importation) of competing fuels and conservation techniques; and by encouraging the development of resources at a rate that accurately reflects the value of energy today versus its value to future generations of Canadians.

Efficiency is not the only objective of energy policy. But if it is achieved, other objectives — including energy security and an equitable distribution of energy benefits and costs — will be more readily attained. Competitive market pricing of Canada's energy resources would promote this objective. Unregulated prices would provide participants in energy markets with flexible signals that would guide decisions about production, consumption, and conservation. Price flexibility would ensure that adjustment by producers and consumers would take place promptly when imbalances arise between energy supply and demand. A uniform market price for oil, in contrast to the many prices that currently exist for oil from different sources, would also help ensure that the least-costly resources are developed first. Allowing market prices to allocate scarce energy resources and to ration consumption during temporary shortages also has advantages over costly and slow bureaucratic allocation systems.

In spite of these apparent advantages of adopting a market-pricing approach, Canadian policymakers have consistently taken steps to override market pricing as the principal mechanism for meeting this country's energy objectives. Leonard Waverman of the University of Toronto points out in his contribution to this volume that the emphasis of past Canadian energy policy has alternated between encouraging development of Canadian resources and achieving a fair distribution of the wealth generated by higher world prices.[3] Energy policy in the 1960s encouraged development by maintaining domestic prices above world levels. In the 1970s, policy attempted to distribute the benefits of

[3]Leonard Waverman, "Canadian Energy Policy after 1985: Lessons from the Present," in this volume.

Canada's resource wealth by holding domestic prices below world levels. Neither of these approaches has been able to withstand the pressures imposed by changing world market conditions. A policy that accepts world energy prices as the true opportunity cost of Canadian resources and that focuses upon minimizing the costs of adapting to changing world market conditions promises to be the most durable approach in an uncertain world environment.

Why Canada Needs an Energy Policy

Although a market-oriented pricing system can enhance economic efficiency and flexibility, an energy policy remains necessary to address both the political realities of Canada's constitutional system and the limitations of the market. There are five major reasons why Canada needs an energy policy:

- *To recognize the constitutional division of power.* Canada's provinces own the energy resources within their borders, while the federal government has constitutional responsibility for interprovincial and international trade and national economic management. This fact makes federal-provincial agreements on energy pricing, taxation, and trade issues essential.
- *To reduce vulnerability to energy shocks.* Abrupt changes in oil supply conditions and world market prices during the past decade have demonstrated the disruptive effects that such shocks can have in world energy markets. An important objective of energy policy in an unpredictable world is to reduce Canada's vulnerability to the harmful effects of supply interruptions and sudden price changes.
- *To achieve an acceptable distribution of energy rents.* The sharp upward price movements in the 1970s created windfall profits or economic rents of unprecedented magnitude for the owners of existing energy production.[4] Allowing market prices to prevail with no change in taxes would have led to a huge transfer of income from energy consumers to energy-producing firms. In Canada, this situation was particularly unsatisfactory because most of the windfall profits would have accrued to foreign firms, which controlled 75 percent of oil and gas production. Governments, because of their ownership of energy resources, imposed

[4]Economic rent is the income left when all costs of producing resources, including an adequate rate of return on capital, are subtracted from the total revenue earned from their sale.

their claim on these rents and redistributed them within the producing provinces and to energy consumers across the country. Distribution of energy rents is essentially a political issue that must be negotiated and built into Canada's energy policy.

- *To reduce risk and uncertainty.* In the age of megaprojects characterized by geological and technical uncertainties as well as by great financial risk, government has a role to support energy exploration and development. How great a role this is depends on such factors as the strategic value of improved knowledge about the nation's energy resources and expectations about the future availability and price of imported energy.
- *To regulate noncompetitive markets.* The lack of a competitive market structure in certain segments of the energy industry makes some degree of government regulation necessary. Electricity, for example, is produced and distributed in Canada by provincial government monopolies. Economies of scale create natural monopolies in oil and gas pipelines where market action among many buyers and sellers in price setting is absent. In these and other sectors of the energy industry, government intervention in pricing and investment decisions compensates for the absence of competitive market conditions.

The Dimensions of a Flexible Energy Policy

Canada needs an energy policy to address political realities and the limitations of the market. But that policy need not replace the market. Instead, it should aim to improve upon the market's performance.

What would be the features of such a policy? The first and most important would be to let the world price of oil determine a single price for Canadian oil production — regardless of its source. The price of natural gas would also be more directly determined by market forces — both within Canada and in export markets. Regulated electricity prices would then be influenced directly by competing prices of oil and gas that reflect market realities.

The second feature of a market-oriented energy policy would be a tax system designed to collect economic rents without unnecessarily distorting decisions about where to invest and what type of energy to produce. Such a tax system would incorporate provincial royalties graduated for different broad types of oil and gas and characterized by significant differences in production costs. A federal tax would be similarly graduated. Thus, instead of having many different prices for oil, there would be a single price with revenue sharing determined by the tax system.

A third feature of this policy would be a set of mechanisms for dealing with future supply or price shocks. The domestic price of oil and other types of energy would be allowed to depart from market-determined levels only if externally generated price shocks were so large as to be seriously destabilizing for the domestic economy. The price system offers an effective mechanism for allocating energy supplies during periods of shortage. But changes in the tax system and the development of a program for the distribution of strategic energy reserves would also be required to offset the adverse effects of energy shocks. Because of concerns about fairness, contingency mechanisms would also be required in the federal taxation and transfer system to cushion temporarily the effects of unanticipated price increases on low-income, oil-consuming individuals and regions.

The fourth feature of a market-oriented energy policy would be greater reliance upon market prices as an incentive for exploration and development. It made sense for the federal government to subsidize a search for frontier energy resources when the NEP was introduced in 1980 because little was known at the time about the extent of commercially viable reserves, and because energy prices were expected to keep on rising. Speeding up exploration could be expected to benefit Canadians, so a rationale existed for government to underwrite some of the cost and risk. Prices are no longer rising, however, and excess capacity overhangs the world oil market. Huge subsidies for frontier exploration now promote a costly misallocation of Canada's scarce capital resources. Greater reliance on market incentives rather than on government subsidies would reduce this misallocation.

These are key features of a more flexible energy policy for Canada. They are quite different from existing policies. The present policy has required continuous, piecemeal changes to respond to market pressures. These changes create greater uncertainty than would a systematic move to a more flexible, market-oriented policy.

The Transition: Some Options

How would the transition to a market-oriented policy take place? Some changes could be made quickly. Others would have to be phased in or "grandfathered" to protect those investors who made decisions because of incentives provided by the NEP.

Energy Pricing

Changes to energy pricing policy could be made right away. Most important, both symbolically and substantively, would be to deregulate the price of crude oil. Deregulating oil prices would *not* impose a major price increase on Canadian consumers. The blended price of crude oil under the existing complex pricing formula is presently over 90 percent of the world price. Moving to 100 percent of the world price would be relatively painless and would have significant benefits. It would allow the dismantling of the complex petroleum compensation scheme adopted in the 1970s to subsidize domestic oil users. It would also reduce uncertainty about future pricing. Market participants would still have to form expectations about the course of world oil prices but they would no longer have to guess what domestic pricing regulations would be.

Changes in natural gas pricing policies are already well underway but further deregulation is possible.[5] The first step would be to eliminate the artificial ceiling that keeps the price of natural gas at 65 percent of the heating equivalent price of oil. Although natural gas is a substitute for oil in some uses, forces at play in natural gas markets are often quite different from those in oil markets and call for movement in gas prices unrelated to changes in oil prices. For example, tight oil supplies need not indicate tight natural gas supplies and higher prices. One purpose of the 65 percent thermal equivalence pricing policy was to induce consumers to substitute natural gas for oil. Market prices, by themselves, would provide ample decisionmaking information to consumers who are considering switching fuels.

Deregulation of natural gas prices means that Canadian export prices would continue to become more sensitive to demand conditions in the United States. For Canadian producers to increase sales in the U.S. market, gas exporters, together with pipeline companies, need the flexibility to negotiate contract prices with U.S. customers. A competitive position would require prices determined by market conditions prevail-

[5]On 13 July 1984, the federal government announced several planned modifications to its policy on natural gas export pricing. Beginning 1 November 1984, companies may choose to negotiate contract prices and terms or to follow the existing two-tier export price. The National Energy Board will continue to monitor contracts. Negotiated export prices must not be lower than the Toronto city-gate wholesale price and prices in the United States must at least match prices of alternative energy sources. Contract terms should allow a response to changing conditions but must also contain "reasonable assurance that volumes contracted will be taken by the buyer," (Department of Energy, Mines and Resources, *Communiqué*, 84/81, 13 July 1984).

ing in the disparate geographical regions of the United States. The common export price for natural gas would disappear. Export sales, however, could remain subject to government approval under this system.

A flexible export price for natural gas would be matched by a phased deregulation of domestic gas pricing. This would mean eliminating the Toronto city-gate price of gas set by the federal government and returning to the market-pricing system that existed prior to 1974. To facilitate direct contracting between producers of gas and gas distribution companies, steps should be taken to make major gas pipelines common carriers. This would mean that pipelines would not exert market power by virtue of being the sole buyers of natural gas.

Deregulating oil prices and eliminating the link between oil and gas prices would also increase market pressures on electricity rates. The export price, for those provinces which export significant amounts of electricity to the United States, represents the opportunity cost, or cost of alternate uses of the resource. Although electricity is not perfectly interchangeable with other sources of energy, the supply and price movements of other fuels can affect the course of electricity rates.

Jurisdictional concerns, revenue-sharing and rent-capturing issues, and characteristics of the specific market structure would all continue to influence electricity pricing. Domestic sales and rates fall within the purview of the provinces and their electrical utilities, while exports are regulated by the federal government through the National Energy Board. Regulations in most provinces limit profitability and, thus, prices. In addition, because the federal-provincial equalization formulas are based on revenues rather than on rents, these agreements serve as an incentive for provinces to keep electricity rates low, thus returning economic rents directly to consumers. Electricity pricing will continue to be regulated in the future, but market pricing of competing oil and natural gas would make electricity prices more responsive to changing conditions in the energy market.

Taxation and Revenue Sharing

The taxation system is central to the development of a flexible energy policy. It is the instrument by which governments collect their share of energy revenues. It can be an effective mechanism for moderating the impact of energy supply or price shocks. It can also be used to administer exploration and development incentives.

The existence of substantial economic rents associated with established, low-cost oil and gas wells and the ownership of the resources by governments mean that different tax rules apply to the energy sector than to other segments of the economy. In his contribution to this volume, Ronald Wirick of the University of Western Ontario emphasizes the importance of designing energy taxes to collect economic rents with minimal distortion of production and consumption decisions.[6]

A central issue in claiming a share of energy rents concerns the size of the rents. Theoretically, governments can "recapture" economic rents without distorting investment or production decisions because a return on capital is considered part of production costs. In practice, however, it is extremely difficult to determine an "adequate" return on risky investments and to devise an efficient means of collecting rents. Because energy prices, revenues, and rents can move downward as well as upward, it is important that tax policies have a neutral effect on the economic viability of energy projects. If energy prices decline, inflexible taxes such as basic provincial royalties and the federal Petroleum and Gas Revenue Tax can reduce the after-tax return on otherwise-attractive developments.

The size of available rents varies according to the cost of the resource. Canadian energy resources range from low-cost conventional oil in already-delineated pools in the Western Sedimentary Basin to high-cost frontier oil and gas below the Beaufort Sea and in the Hibernia field off Newfoundland. The tax system could be used more effectively to gather economic rents if federal and provincial royalties were graduated to reflect the different sizes of rents.

One option, suggested by the International Energy Agency, that could provide greater flexibility would be to introduce a single tax/royalty system — apart from the ordinary corporate income tax — to replace existing provincial royalties and federal energy taxes.[7] The revenue could be split according to agreed-upon proportions between the federal and provincial governments. Such a tax could be sensitive to the low returns on some wells and would, therefore, be a rent tax only.

Another option for more equitable energy revenue sharing, suggested by Bruce Wilkinson of the University of Alberta, would be to include

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[6]R.G. Wirick, "Managing Canadian Energy Demand and Supply," in this volume.

[7]Organisation for Economic Co-operation and Development, International Energy Agency, *Energy Policies and Programmes of IEA Member Countries, 1982 Review* (Paris: OECD, 1983), p. 138.

energy rents in the calculation of federal equalization payments to the provinces.[8] The current equalization formula is based on a "representative five-province standard" that excludes Alberta, the province with the greatest oil and gas revenues.[9] It also excludes the rents associated with domestic energy prices that are lower than world levels from all calculations of provincial revenues. The excluded rents, particularly for electricity, are substantial. A change in the equalization formula to more fully incorporate energy revenues and rents would broaden the scope of energy revenue sharing and more fully involve provinces, such as Ontario and Quebec, that produce large quantities of electrical power.

The existing equalization formula can also have the effect of penalizing "have-not" provinces for developing their energy resources. As provincial revenues from energy development increase, the required equalization payment from the federal government is correspondingly reduced. This paradox underlies the inability of Newfoundland and the federal government to reach a revenue-sharing agreement that is essential to the development of the Hibernia oil field. (Management of the method and pace of development is a separate, complex issue.) The federal government has proposed that Newfoundland receive a substantial portion of oil and gas revenues and continue to receive equalization payments until its fiscal capacity surpasses the national average. The Newfoundland government argues that fiscal capacity inadequately measures the province's economic well-being and maintains that, in spite of the Supreme Court of Canada's decision confirming federal jurisdiction over offshore resources, Newfoundland ought to receive the same treatment as do other provinces that have energy resources within their boundaries. Only a political compromise between Newfoundland and the federal government will resolve the issue.

Dealing with Future Energy Shocks

Energy security has been an important objective of Canadian energy policy since the oil shock of 1973-74. Policies to promote energy security have aimed to protect Canadians from the damaging consequences of disruptions in energy supplies and sharp increases in world energy prices.

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[8]B. W. Wilkinson, "Energy Revenue Sharing," in this volume.

[9]For a detailed examination of the equalization system, see Thomas J. Courchene, "Canada's New Equalization Program: Description and Evaluation," *Canadian Public Policy* 9 (December 1983): 458-475.

The uncertain prospects for world oil markets in the future imply that energy policy should incorporate mechanisms to deal with either sharp upward or downward price movements.

If Canada is to adopt more flexible, market-oriented energy pricing it is imperative that a system dealing with future supply or price disruptions also be developed. A contingency plan for dealing with shocks would have several components. The first would be a commitment, in the event of either supply or price disruptions, to allow domestic energy prices to move — either up or down — with international prices. Flexible prices offer the best mechanism for allocating energy supplies during periods of shortage and reducing excess supply during a glut.

The second component would be to allow domestic energy prices to depart from world prices only if externally generated price shocks were so large as to be seriously destabilizing for the domestic economy. Any departure should be temporary, however, and should be accompanied by a commitment to an early return to the world price should the change prove durable.

The third element would be an energy tax system designed to cushion the impact of energy shocks on the economy. In the event of a sharp price increase, most of the additional revenue should flow to governments. One option would be a standby windfall profits tax. The increased government revenues from such a tax could be recycled to households and firms particularly hurt by the shock. Similarly, most of the revenue loss associated with a sharp drop in energy prices — and energy rents — should be absorbed by governments so that economically viable domestic energy would continue to be produced.

The fourth component of this contingency plan would be a standby delivery system to replace oil imports in eastern Canada in the event of oil supply interruptions. On the supply side, Canada has a sizable strategic reserve in the form of excess capacity in the energy sector. The problem of distributing that excess capacity to parts of the country that are currently served by imports has been partially overcome by the extension of pipelines to Eastern Canada, but further moves to increase the deliverability of Canadian energy in times of international shortage may still be warranted.

Exploration and Development Incentives

Greater reliance on market prices can also play a useful role in guiding decisions about investment in energy exploration and development.

Government has a role to play in encouraging such activity when risk and uncertainty reduce the private return from energy exploration. In 1980, when the energy outlook was dominated by concerns about supply interruptions and the expectation that prices would go on rising steadily, the social value of information about the extent and commercial viability of frontier energy resources exceeded its value to energy-producing firms. Thus, it made sense for the federal government to subsidize high-risk energy exploration and development by private firms. It also made sense to increase the Canadian presence by augmenting Petro-Canada's exploration budget with federal equity infusions. Petro-Canada provided the federal government with much-needed information on the workings of the petroleum industry and particularly on Canada's frontier energy potential.

In 1984 the world situation has changed to one of excess capacity and declining prices. John Grant, Vice-President and Chief Economist of the investment firm Wood Gundy Limited, points out that in an environment of declining energy prices and high real interest rates, it will be increasingly difficult for a large number of energy projects to meet the viability criteria of financial markets.[10] Consequently, private firms are finding innovative ways to scale down megaprojects in order to reduce their financial risk. At the same time, the trend toward fiscal restraint by Canadian governments means that any decisions on energy investment incentives will be taken in what Grant terms "an exceedingly tight-fisted climate."

Within this climate, the rationale for the heavy subsidization of frontier energy exploration has been seriously eroded. By promoting a massive shift of exploration and development away from conventional projects in Western Canada to high-cost, high-risk frontier regions, the existing Petroleum Incentives Program (PIP) has sacrificed the notion that low-cost resources should be developed first.

A market-oriented policy, although reducing grants offered on new projects, would continue to honor PIP commitments on existing exploration projects through the end of 1986, when the program is scheduled to be reexamined and altered if necessary.

Indeed, it would be worth considering whether the PIP grants should be eliminated altogether after 1986 and replaced with a less discriminatory, tax-based incentive system. The choice between direct grants and a tax-based incentive system can be evaluated on the basis of

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[10]John Grant, "Financing Energy Developments, 1985 and Beyond," in this volume.

program costs, administrative requirements, and ease of targeting program benefits. In terms of program costs, both direct-grant and tax-based incentives can be designed to have similar net cost to the government. A grant program requires a significant administrative staff to evaluate claims, especially when grants are differentiated according to the location and degree of Canadian ownership of the corporate entity involved. A tax-based incentive system would also require tax officials to evaluate claims, but these requirements would be smaller because there is less scope for differentiating between firms within the tax system.

A grant system has a clear advantage in targeting program benefits. Indeed, the primary reason that the PIP grants were implemented was because they allowed the federal government to direct benefits toward Canadian firms exploring in the federally-controlled frontier areas. Canada's involvement in international tax treaties that restrict unequal tax treatment of foreign firms meant that the kind of targeting used in the PIP program could not have been achieved through the tax system. It is this very targeting, however, that is no longer warranted.

Changes to the existing Petroleum Incentives Program could not be made overnight without creating chaos for companies participating in frontier exploration. Many smaller Canadian companies would not be involved in high-risk frontier exploration were it not for the fact that the federal government pays up to eighty cents of every dollar spent. Thus, changes to the program should be phased in so as to allow time for firms to restructure their frontier activities in light of changing world market conditions and a revised incentive system.

Creating a Positive Climate

Canadians have an opportunity, when existing energy agreements expire at the end of 1984, to alter energy policy in ways that would increase our flexibility in dealing with unforeseeable energy developments in the future. These policy changes could reduce the uncertainty that has hung over energy consumers and producers for the last decade. To achieve this end, however, several important issues must still be resolved.

First, a new consensus on the role of government in directing patterns of energy development and use in Canada is badly needed. It is the lack of such a consensus that produces the greatest uncertainty about energy policy. The tendency for both the philosophy and the structure of government pricing and taxation policies to change unpredictably adds unnecessarily to the already-great uncertainties produced by unstable

world energy markets. A new consensus that Canadian energy policy should focus on developing a stable but flexible framework for private decisionmaking would advance all of Canada's energy policy objectives.

Second, if energy pricing is to be more market determined it is essential that a framework be developed for dealing with future international energy price or supply shocks. Important questions that need to be answered include: Under what circumstances should Canadian energy prices be allowed to depart from international prices? What contingency mechanisms can be built into the tax system to cushion the impact of a sharp energy price rise — or fall — on consumers and producers? What scope is there for enhancing emergency delivery systems in the event of another oil supply disruption?

Finally, political and constitutional realities in Canada mean that energy policy will continue to be made through a process of negotiations between federal and provincial governments. Experience has shown that this process works best when the two levels of government work together to develop responses to emerging policy issues. Involving representatives of the energy industry and consumer interests further broadens the base on which energy policy is built and enhances its durability. A more consultative approach to energy policy formation has been adopted since 1982, but the question remains as to whether this approach should be institutionalized. For example, a permanent federal-provincial committee on the state of the energy sector and energy policy would provide a mechanism for ongoing consultation between the two levels of government. Such a committee could report annually to the people of Canada and provide a much-needed forum for input and critique by interested parties.

Canadians face the task of dealing with these issues if we are to make the best of uncertain world energy prospects. The challenge we face for the coming decades is to accept and absorb the unavoidable costs of potential future energy shocks without incurring additional unnecessary costs created by domestic policy mistakes. If we can meet this challenge, changes in energy markets will promote, not threaten, Canada's future prosperity.

2

The International Context[1]

M.A. Adelman

The hinge of world energy markets is the supply and price of oil. Although prices of other fuels stand in no fixed relation to oil, they are strongly influenced by it. Thus, the most important question for policy is, What may one reasonably expect of the world oil market?

The Visions of 1978–81

Until its close, 1978 was a normal year, very like the four preceding it. Oil was in oversupply and prices were weak, as usual. But the industry-government consensus was that this was only a temporary condition. The International Energy Agency (IEA), whose views are all-important because they embody the consensus of the member governments, warned in August 1978 that, by 1985, the non-Communist world would "need" 44 million bpd of OPEC exports, but that there would be only about 37 million bpd "available"; thus, an acute shortage was on the way.

When prices rose in 1979, the consensus seemed to be proved right. The price had nearly tripled in less than a year; therefore, it would keep going up, up, and away. In Britain, the former Minister of Energy, Lord Balogh, thought that the price limit would be around U.S.$100 (in 1980 prices). In the United States, bankers were eager to lend — and oilmen eager to borrow — for projects that would not pay unless oil prices continued to rise from 1980–81 price levels — at 3 or more percent real, 6 percent nominal — toward a ceiling that the more soberminded thought would be U.S.$60. The bolder spirits expected $100 — about $115 at

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[1]This paper draws on past and ongoing work at the MIT Energy Laboratory. I have benefited from collaboration with Paul Carpenter, Loren Cox, Henry Jacoby, Michael Lynch, Thomas Neff, James Paddock, Geoffrey Ward, and Martin Zimmerman, none of whom is responsible for errors herein.

1983 prices. Oil and gas properties and corporations were bought at extravagant prices; shareholders lost heavily. The losses that soon occurred were not inflicted by the mild price decline but rather by the price increase that never happened.

The consequences of these unexpected losses varied throughout North America. In the United States, the losses were private, including unemployment in supporting industries and the disappointed hopes of those who expected to gain a modest livelihood from the oil boom.

In Canada, the National Energy Program was based on an expected price — midway between high and low — of $54 by the end of 1983; it was actually $29. Only because prices were expected to keep rising strongly did it seem to make sense to pour public funds into frontier exploration. The federal government also hoped to take a large slice of the expected soaring profits by buying out foreign owners. Aggrieved foreign oilmen found their distress softened, however, when they realized the profits they had been compelled unwillingly to take. Furthermore, the forced expatriation of foreign capital undermined the Canadian dollar.

In Mexico, both the private and public sectors borrowed on the assumption of rising exports at rising prices. What they got were static or mildly declining revenues, a crushing interest burden, loss of exports, a weakened currency from which holders stampeded, followed by a drastic fall in imports of both finished goods and raw materials and a prolonged recession as policymakers tried to work their passage back.

The Current Consensus

As in 1978, the conventional wisdom is that prices will be quiet for the next few years, and then gradually rise as growing demand dries out the surplus. Granted, in 1983 OPEC has exported only about one-third of the 44 million bpd that the IEA expected the world would "need" in 1985. But we need only wait: "IEA warns supply shortage may hit after 1985."[2] Those hopeful Americans, Canadians, and Mexicans had been perhaps a little too hopeful in the past, but all they need to do now is hold on for a few years, recognize the intrinsic values of oil and gas, and all will yet be well.

The lesson — that the price increases of the past decade have nothing

[2]*Oil and Gas Journal*, 12 October 1982. See also *Petroleum Intelligence Weekly*, 4 October 1982.

to do with scarcity — has not been learned. As in 1978, predictions of long-term "shortage" are preparing the way for fresh bouts of drunkenness, while the debris of the last one still encumbers the ground.

What really has happened is that, on the demand side, we have had a wrenching decade of adjustment, and more is to come. Supply, on the other hand, is set by a cartel groping its way toward the price-output combination that will maximize revenues. The future promises to be no more stable than the past, but the odds against a strong, permanent price increase are now much greater.

Demand and Consumption

Outside the Communist bloc and the OPEC nations, where consumption is subsidized, oil use in 1983 will be a little less than 40 million bpd, which is about the same as in 1970.[3]

Nothing remotely like this has ever been seen before, not even in the Great Depression of the 1930s. In part, it reflects lower economic growth. Every industrial country, without exception, has shown a sharp decline in the growth rate of output and of productivity since 1973. Much, perhaps most, of this was due directly and indirectly to the oil shock. Precisely how much, the econometricians may sort out in the next decade.

The less-developed countries seemed for a season to be almost immune. They borrowed to maintain growth, or to continue eating, and hoped something would turn up. Now they must squeeze their economies — and their people — doubly hard to repay debts. The situation is much worse in Latin America than in Asia, and worst of all in Africa.

Yet even with slow growth, total incomes worldwide in 1982 were

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[3]Production in 1970, including natural gas liquids, was 40.5 million bpd (British Petroleum Company Limited, *BP Statistical Review of the World Oil Industry, 1970* [London: BP, 1971], p. 19). OPEC consumption was 1.5 million bpd (United States, Department of Energy, *International Petroleum Annual 1972* [Washington, D.C.: U.S. Government Printing Office, 1972]). During the first seven months of 1983, production was 39.8 million bpd (*Petroleum Intelligence Weekly*, 12 September 1983, p. 11). OPEC consumption in 1982 was 3.0 million bpd (United States, Central Intelligence Agency, *International Energy Statistical Review 1982* [Washington, D.C., 1983], and rose again in 1983. Communist exports to the rest of the world may have been as much as 1.0 million bpd higher in 1983 than in 1970. It is impossible to say what happened to inventories. Thus, the safest statement is that consumption in 1983 did not exceed that in 1970, and may have been less.

roughly 26 percent greater than they were in 1973.[4] Thus, oil intensity — oil use per unit of output — declined by 21 percent. The year 1983 saw continued very modest growth worldwide, but again as absolute shrinkage in oil consumption, so oil intensity continues to fall.

In part, this is the result of the substitution of other fuels. Much more important, however, has been the substitution of labor and capital for energy in the production and consumption of goods, and the substitution of less for more energy-intensive products. It is an immensely complex process of *investment* in new, tangible capital and in new ideas. Thus, Japan, with the highest investment rate among the developed nations, shows the most rapid reduction in energy use, and especially in oil use, per unit of output.[5]

Rome was not built in a day, nor even in a decade. The capital stock changes slowly, especially during a period of slow growth and low investment. Given the service lives of most capital assets, I doubt that the half-lives of the price shocks of 1973 and 1979 could be any shorter than five years. If that is the case, we have probably done most of our adjusting to the first shock, but not to the second.

But the very fact of adjustment slows economic growth. Improved energy efficiency is a second-worst case. The investment in more efficient energy is not available for increased or improved output. The North American automobile industry will probably have spent U.S.$100 billion in this decade but will have no greater capacity at the end of it than at the beginning. The saving in fuel will cost us the investment and output we could have had, had we not been forced to protect ourselves against high oil prices. The heavy investment in North American oil and gas has had similar results. To make it was less of a drain on our economies than to pay high prices for imported oil. It was right to choose the lesser evil. It was and is "strange abuse" to pay more than necessary, that is, to obtain hydrocarbons at home at a cost even greater than the cost of imports.

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[4]See United States, *Economic Report of the President, transmitted to the Congress February 1983* (Washington, D.C.: U.S. Government Printing Office, 1983), p. 285. Developed countries grew by about 23 percent during that period. Non-oil-exporting, less-developed countries grew by 44 percent. Weighting the developed countries at 80 percent of the total, a rough average would be 26 percent.

[5]Income changes from United States, *Economic Report of the President*, and consumption changes from *BP Statistical Review of the World Oil Industry*.

The Exporters' Cartel and Oil Prices

By 1970, consumption had been increasing for decades by 7.5 percent per year, doubling every decade. Yet prices had been persistently weak, and very slowly declining, because they were considerably above long-term marginal cost.

It is reasonable and prudent — though sometimes wrong — to expect that, over time, better, lower-cost oil reserves will be depleted and be replaced by higher-cost reserves. If this is so, one should expect a time path of rising marginal costs and, therefore, of prices, "all else being equal." New discoveries and technologies may displace that whole curve downward, even as it keeps its upward slope. But even putting that caution aside, the price in 1970 — about U.S.$3 per barrel at 1983 prices — was already higher than that which the upward-bound curve would have reached. Because the oil-producing companies felt the pressure of excess long-term supply over expected fast-growing demand, and because they knew the price was above the competitive equilibrium, they dreaded the constant demands of host governments for *higher* production. (The myth that these governments wanted less output came later.) Known reserves were so large, and could be augmented by new reserves so cheaply, that any future increase in costs, and thus in future prices, was considered likely to be too small and too far-off to affect 1970 prices.

It is interesting to speculate about what would have happened had the cartel not taken over. So far as we can tell, and assuming no great new discoveries, the increase in marginal costs and prices would have been an insignificant fraction of the actual increase because of very weak pressure of depletion on known reserves.[6] Whatever might have been,

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[6]In a competitive industry, prices are always approaching long-term marginal costs. The faster the depletion rate of a mineral deposit and the greater the volume of past depletion, the higher the operating and investment costs. But, the faster the depletion rate, the greater the present discounted value of the production when sold. Therefore, every mineral operator must, at all times, choose the optimum depletion rate. If the deposit is very large in relation to current output, and the costs are low, then the penalty for accelerating depletion is small. A high probability that additional deposits may be found, albeit at moderately higher cost, makes the penalty smaller yet. If prices increase in the future, the gain from postponing output is also small; because the future output is so distant, its present value, discounted for risk, is also low. In such a deposit, the "scarcity value" or "user cost", over and above the low operating and investment costs, is also low. This is the case in Saudi Arabia and other "core" OPEC countries, including Mexico.

As a crude approximation of user cost in the Persian Gulf fourteen years ago, I assumed

the huge reserves that hung over the market to threaten prices in 1970 and earlier are still there, little depleted. Moreover, since then we have had the Mexican discoveries.

It is impossible to ascribe the current price level to competitive supply and demand. What explains the evolution of the 1970s is the strength of the cartel of the OPEC nations — not the existence of OPEC itself, which has never been of any importance. First, it is obvious today that the price would have dropped precipitously if the OPEC members, plus Mexico, had not curtailed exports drastically. Disregarding short-term fluctuations, the great bulk of the world's oil, which once could be profitably produced at less than $3 in 1983 prices, must surely be available at something less than $10 — settling all possible uncertainties in the upward direction. At such a price, much oil would be shut in, but much more that is now held back would be developed.[7]

Second, one must explain why some oil-producing areas are investing so much more than in 1973, others so much less. The United States, having endured the recent shakeout, is drilling 3.6 times as many oil wells in 1983 as a decade ago. Canada, despite much governmental discouragement, is drilling over twice as many; Saudi Arabia is drilling about half

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zero discoveries during 1970–85, while output expanded at 11 percent per year, consuming 170 billion barrels over 15 years. Growing pressure upon decreasing reserves would, I calculated, raise development-operating costs from about 10 cents in 1968 to 20 cents in 1981, or from about 25 cents to 50 cents in present-day dollars. The increased cost was what I called "Maximum Economic Finding Cost". In view of the considerable errors of estimate, there seemed no point in discounting. (See M.A. Adelman, *The World Petroleum Market* [Baltimore: Johns Hopkins University Press for Resources for the Future, 1972], Ch. 2.) A rough check on those estimates, using data for Saudi Arabia, shows the increase between 1966–68 and 1978–80 to be about half of the estimate. That is as it should be. There have been considerable reserve additions (as against my estimated zero), and cumulative Persian Gulf output in 1970–81 was only 81 billion barrels, less than half of what I assumed.

There is a more authoritative estimate of maximum or actual finding cost. The 1976 agreement between Aramco and the Saudi Arabian government provided an "exploration fee" of 6 cents per barrel, to escalate with inflation, so that it is approximately 10 cents per barrel today. That is the peculiarity of an "irreplaceable asset", which is constantly replaced when there is an incentive to do so.

[7]See, for example, the informal survey conducted by *Petroleum Intelligence Weekly* (4 April 1983, p. 4). Production would not be shut in until the price fell to "absurdly low levels of less than $10." With a longer time horizon, it would be $12–16. But the respondents do not envisage any shutting-in of high-cost fields to be made up by expansion of low-cost fields, which is a severely distorting assumption. The high-cost North Sea oil is estimated as mostly between $6 and $12.

as many.[8] (Various ingenious reasons have been offered for the slowdown in the OPEC areas. We will examine them shortly.) The North American industry is composed of pricetakers, independent competitors. The Saudis are chief among the pricemakers.

This is a radical reversal of the pre-1973 trend, and impossible in any competitive world. The big, low-cost reserves are being depleted ever more slowly, while the 1973 reserves in the United States have been used up completely — "turned over" about 1.25 times — despite their higher cost.[9] There is a good probability that the largest low-cost oil reserves in the world will never be used, but will lie fallow until the world reaches the threshold of the post-oil era, whenever that comes. A gross economic waste, to be sure, but good monopoly management of assets.

Third, had the price been determined, in any substantial degree, by the pressure of demand upon limited supply, it would have crept up gradually, with occasional falls and rises. What we saw was quite different, and we need to look at it more closely.

The Three-Stage Process of Price Increases, 1973-4 and 1978-81

In 1973, as in 1978, the sequence of price increases was clear. First, although the boycott of the United States was a failure — the target country fared better than the "friendly, preferred" British and French — the two production cuts were highly effective. Yet these cuts only amounted to, at most, 10 percent of the world's consumption, and could have been absorbed by normal commercial inventories.

Second, the production cuts unleashed panic. The loss inflicted by shutting down a refinery, or an electric power plant — or a taxi, or a truck — for lack of feedstock or fuel is so great that extravagant prices will be paid to avoid it. So spot prices spurted. Soon, the needy were joined by the greedy. The hope of a quick speculative profit drew in much more buying, which drove prices still higher. The OPEC nations were quick "to follow the market", which their Arab members had contrived, and raised the price from $2 per barrel in October 1973 to something over $7 per barrel on 31 December 1973, by setting that as their tax.

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[8]Oil wells in the United States, from *Oil and Gas Journal* (ultimately, the American Petroleum Institute). The 1973 total was 9,900; the 1983 rate (for the first eight months) was 35,800. Wells drilling outside the United States, from *World Oil* (annual International issue, August 1983).

[9]See *Oil and Gas Journal* (annual World Wide Oil supplement, 1983).

The third stage was equally important. Almost from the start of 1974, there was an oil glut. But far from following spot prices down, the Persian Gulf price increased several times, from $7 per barrel to $10.50 per barrel by October 1974. Saudi Arabia was the leader; the Shah of Iran talked a big game, but was content to follow.

There followed three more years of glut, but the price continued to increase, to $12.50 per barrel by 1977. Unfortunately for the OPEC nations, these increases were all speedily cancelled by inflation. We need to recall, however, how water persistently ran uphill, and prices increased in the face of oversupply.

The year 1978 saw continued glut and, once again, preparations for a new price increase. The Iranian Revolution provided an unexpected occasion. As in 1973, the loss of output was so small it could have been covered from commercial stocks — had there been any assurance of continued supply. This should have been no problem, because there was considerable excess capacity. But any hope of stability vanished when Saudi Arabia cut production in January 1979. By the end of March 1979, spot prices had stabilized, then began to weaken. A glut again seemed imminent, so the Saudis cut production once more and spot prices erupted again.

There was continuing speculation about the Saudis' goals. At any moment, they could have lowered the price to any level they wished by the simple announcement that they would sell at that price to the limits of their capacity. But the Saudis had no wish for lower prices; on the contrary, their production policy pushed prices higher.

In June 1979, Sheik Yamani told a grateful Tokyo summit that Saudi Arabia would "never" allow a price as high as $20 per barrel. I do not think this was duplicity. The Saudis were temporizing, acting like sensible, cautious monopolists, feeling their way into what the traffic would bear. As in 1973, official prices kept climbing long after spot prices had collapsed and the glut had become severe. The last increase was in October 1981, from $32 to $34 per barrel.

In both 1973 and 1979, the power of the cartel was shown less in its ability to create and use a price explosion than in its ability to hold the line during the glut that followed very soon thereafter. Its best offense has been a remarkable defense.

How Close to the Monopoly Ceiling?

Because the cartel members are sovereign states, they fit the economic

model of a cartel with unusual smoothness. Private firms experience limits on their power to control markets. Even without antimonopoly laws, governments can make life "nasty, brutish, and short" for private firms. No group of firms would dream of raising the price of a commodity like oil tenfold, in real terms, in a decade and amassing monopoly revenues of nearly a billion dollars every day.

The interwar cartel of the oil companies, the famous "Seven Sisters", never asked what their optimal price might be, the one that would maximize long-term profits. This is a practical question for the OPEC nations, and one that was analyzed in a careful report, released in February 1980, by a special committee of ministers chaired by Sheik Yamani. This was not an advisory group, but rather an executive task force. The committee thought that the ceiling for oil prices was the cost of synthetic fuels, a ceiling comfortably far-off that they felt they ought to continue approaching, but not so fast as to upset the world economy too badly.

This is rational conduct for a group monopoly, but I venture to say one factual premise is incorrect. The true ceiling is set — by consumer resistance — well below the cost of synfuels. The optimal monopoly price lies just below that price which would result in so much lost sales volume that net cartel revenues would be diminished — the neighborhood of unit price elasticity for cartel output, as a whole. I suggested some years ago that the cartel oscillated or wobbled between two models. A residual-firm monopoly was easy to operate: the Saudis — or the Saudis plus other "core" members — made up the difference between market demand at the monopoly price, and the unrestrained output of the cartel "fringe". But the rewards were less than that of a cartel where all sellers bore some of the burden of any cutback. The struggles of 1980-83 are best interpreted, I think, as the demise, probably for a long time, of the residual-firm monopoly model. Excess capacity is now so large that the "core" members would gain disproportionately from lower prices, and lose disproportionately from higher prices, because the benefit or burden would fall predominantly upon them. (The "core" elasticity of demand is today well in excess of unity.)

Needless to say, it is difficult or impossible to calculate the optimal monopoly price. Seat-of-the-pants intuition is probably the best anyone can do. Indeed, the OPEC price may be too high already, and may generate less long-term wealth than would a lower price. The proposition is impossible to prove or disprove.

Cartel Myths, Realities, and Problems

Between August 1980 and March 1983, the OPEC member nations tried four times to limit production and divide markets. Three times they failed, but then succeeded, at least for the time being. The often bitter struggle over market shares should — though it probably will not — put an end to the popular notion that these countries are playing out a charade, and have no cartel; that they merely follow "the market", and accept the price set there. This disregards the two deliberate production cuts, in 1973 and in 1979, followed each time by deliberate supply uncertainty, and also disregards OPEC's concerted production restraint and the persistent underdevelopment of reserves.

Nor is OPEC's pursuit of maximum profit deflected by noneconomic objectives. There is no trade-off or sacrifice in the pursuit of wealth. More wealth is better, whether for consumption, investment, armaments, influence, or whatever.

The powerful myth has been that the "low absorbers" — particularly Saudi Arabia — prefer to keep the oil in the ground, and produce only enough to cover their revenue "needs". Thus, if consumer demand could somehow stay within the limit of these exporters' "needs", happiness; if not, disaster. If more was demanded than the exporters wished to produce, prices would rise. The exporters would then need to produce even less to meet their revenue requirements; their lower production would drive the price even higher, which would lead to still lower production.... It hardly bore thinking of, and it was a good thought-preventive.

The theory of revenue "needs", which never made sense even as theory, has more than once been refuted by the facts. A surge of imports brought the OPEC current account surplus to near zero in 1978 from U.S.$60 billion in 1974. The 1980 surplus of U.S.$110 billion was turned into a deficit in less than two years; it will be around U.S.$33 billion this year.[10] Saudi Arabia spent about U.S.$4 billion in 1973, and over U.S.$80 billion in 1982; the Saudi government managed to run a budget deficit in 1978 and a larger one in 1983, despite much larger revenues. Apparently, what people "need" is what they think they can get. *L'appétit vient en mangeant.*

The oil glut should have come as a great relief for the Saudis. Here was their opportunity to keep more oil in the ground, as they always said they

[10]See *OECD Economic Outlook* (July 1978), p. 131; and *Petroleum Economist* (1983), pp. 171, 215, 370.

yearned to do, and let others make the "sacrifice" of parting with the precious stuff. In practice, of course, they acted like sensible cartelists, and insisted that all must reduce output together.

This is the basic and never-ending problem of every cartel: how to cope with excess capacity. Somehow the cartel must limit production and allocate sales. Informal methods are best, but do not work when excess capacity is too great, as it is today.

In dividing up markets, weakness is strength, and small is beautiful. Each small member may refuse to carry its share of the burden of restricted output, knowing that the other members will, in their own interest, make room for it. If most or all of the small members do this, the burden will be pushed onto the largest, which has no choice. If it shirks carrying the burden, the alliance will crash. But if pushed too far, it will risk collapse and threaten retaliation. That will continue to be Saudi Arabia's uneasy predominance. Among the cartel members, cooperation is far better than confrontation, but good things come hard.

Fortunately for the cartel, wars and revolutions among its members are always likely. In Iran and Iraq, revolution and war have probably destroyed about 3 million bpd of capacity, and temporarily immobilized another 5 million: all told, a fifth of current non-Communist production, and half of current (January-August 1983) OPEC exports. In September 1980, Iraq recalled how in 650 A.D. they had thrashed the "insolent Persians". The Persians, now more insolent than ever, have pushed the Iraqis back, and are now demanding a new regime in that country, plus a $150 billion indemnity.

These 1300-year-old hatreds may well last for 1300 years more. Bigotry, spite, and blood lust are not confined to the shores of the Persian Gulf. But the infusion of billions of petrodollars has fed these passions fat. The war now threatens to turn the Gulf into a dead sea covered by an oil slick. Perhaps some of the local inhabitants take comfort in the fact that it is good for oil prices.

Outlook for the Cartel

I, for one, expect the cartel to survive through the decade. If it collapsed today, the most strenuous efforts would be made to reconstruct it. But it seems far from collapse. Even its current difficulties are a tribute to its power. In three years, the OPEC nations lost about half their export sales. Yet they have been forced to lower the price by only 15 percent.

Cartel members have looked over the side of a cliff, and the view has

concentrated minds wonderfully. The prevailing opinion in the OECD countries is that lower oil prices would be undesirable. This strengthens the cartel, since it need not fear any counteraction by the consumers. Most cartels consider themselves vulnerable to such retaliation; the OPEC cartel rightly does not.

But if collapse is transitory, so is success. The old method of holding to the price, by which a few sellers and a few buyers watch each other, seems impossible. There are too many actors in the play. The British and Soviet governments will cooperate in not reducing the price in any disruptive fashion, but they will not limit output until things get much worse, if then. Mexico, however, has done so; without its cooperation, I do not believe the cartel could hold together.

Pressure on the cartel will hardly decrease. Consumption per unit of national product will continue its slow decline. Given slow growth, consumption will fluctuate between small ups and downs, with a static, perhaps declining, long-term trend. In non-OPEC countries, oil production will continue to creep up.

In many places, natural gas is economic to exploit for local use and will displace oil. It is even economic to liquefy and to transport over long distances, given current prices of substitutes. The price has been kept uneconomically high in most of the world, however, by the fictions, first, that gas is a "premium" fuel with "inherent value" exceeding oil, and second, that it is scarce and getting scarcer all the time. Faith will be slowly eroded by the continuing gas surplus.

A major disruptive force in the world oil market is the decentralized industry in the United States. U.S. refiners now make routine comparison of the offerings of OPEC members and associates with those of hundreds of U.S. oil producers, all of them accustomed to vary prices by the small amount needed to make sure that they sell all they can produce. Even restricting the discussion to light sweet crudes, the United States produces considerably more than the North Sea, and the two streams are in direct competition. Inability to control the U.S. price affects North Sea prices, which affects North African and even some Persian Gulf crudes directly, and all of them indirectly. The world oil market, like the world ocean, is one great pool.

Quality and location differentials among the various OPEC crude oils form an insoluble problem that sets brother against brother. If everyone sticks to the price schedule, some crudes become more attractive than others and some gain market share at the expense of others. Conversely, if everyone sticks to their allowed production, some find themselves pro-

ducing more than the market demands, others find there is excess demand. If the producing nations move into refining on a large scale, this will aggravate the problem, by increasing the number of differentials to be regulated. The accumulation of foreign balances has greatly strengthened the cartel. Conversely, sellers strapped for cash with which to pay debts and procure materials are ripe to become reluctant price cutters, the nemesis of many cartels. Foreign balances are disappearing, or have already disappeared, for all but the most affluent. The 1983 drain, as indicated earlier, is about U.S.$33 billion. Over the next few years, it will probably increase, unless the price of oil is again raised, because of the continuing increase in prices of the goods the oil exporters buy. This will become even more serious if the U.S. dollar, generally considered to be overvalued, declines toward a more sustainable level. We see again the basic instability of the cartel: higher prices enable the accumulation of assets, thus strengthening the drive toward even higher prices. Lower prices generate forces making for even lower prices.

Apparently, the cartel cannot avoid the need to fix total output and allocate market shares, deciding who benefits at whose expense. The automatic mechanism of a competitive market, incremental cost, has been suppressed.

Future Oil Price Trends

We have been forced to spend considerable time laying bare the implicit major premise of the current consensus that prices will be stable for awhile, then rise substantially. That unstated premise is that the price is a competitive equilibrium price, which must move upward with rising costs at the margin of development and production. In fact, low-cost reserves remain so large and are being so slowly depleted, and the price is so far above the marginal-cost level, that cost changes are of very little relevance.

What we would need to know and admittedly do not is, first, the cartel's optimal ceiling price, and second, the cartel's chances of staying together. Whatever may be the level of the former, we are much closer to it than we were a few years ago. Thus, the room for further increases is much narrower than it used to be. As for the latter, I have already indicated why its life will be turbulent, but is not about to end.

It is idle to speculate on whether "the market" will be loose or tight or balanced or whatever in 1984 or 1990. The forecaster cannot choose between shortage or surplus. We are compelled to live with *both*. There is a

permanent surplus, because the price is so far above long-term marginal cost, including any realistic return on the needed investment, as well as any realistic value for oil in the ground that would need to be replaced at higher cost. There is also a permanent shortage, because the cartel exists to maintain it.

If the cartel is successful, the $34 per barrel price will be restored or surpassed. It may, as noted earlier, be too high for long-term revenue maximization by the exporting nations. But many of these countries are unstable and the ruling family, party, or junta must keep its horizons short. Far-off benefits must be heavily discounted as compared with in-hand revenues. If the cartel runs into serious trouble coordinating its members' production, the price could drop far down.

Price Stability Unlikely in the Short or Long Term

Stable markets and prices are not to be expected. To understand why, we need to go back to the glut of 1978 and the price-raising output cuts of 1979. The aim, as Commissioner Brunner of the European Economic Community summed it up in June 1979, was to maintain a small, chronic deficit. He called it "brinkmanship". Or, to paraphrase what one oilman said at the time, the Saudis cut production to create "a nice tight supply situation." What they made was a "world crisis". But they could not help it. The cartel is unavoidably clumsy. Nobody can fine tune with coarse instruments. You cannot match production to demand when you cannot know what demand will be.

Consumption data are incomplete and out of date. Inventory statistics have the gaping hole of unknown distibutor and consumer holdings. Expectations of price movement lead to building or drawing down stocks, and become self-fulfilling prophecies. Short-term demand forecasting, as oil companies have been finding out, is usually impossible. A small surplus will put downward pressure on prices, which the OPEC members and associates do their best to resist. A small deficit, on the other hand, can exert upward pressure, which they will not try to resist.

From April 1983 onward, OPEC nations were pledged to produce no more than 17.5 million bpd. The mechanism has been wound very tight. As every sailor knows, when you take in the slack too quickly, you create a strain that may snap the line. A severe winter, plus a modest revival in world economic activity and in stockbuilding, could at any time generate another supply deficit and another price explosion.

The dominant or "swing" OPEC producers would not necessarily want it to happen. Only, it would seem like simple prudence to hold exports down in the face of reviving demand for only one month more, and then another month, just to make sure that these troublesome swollen inventories really *were* cleaned out.

When there are many decisionmakers on price and production, their mistakes are numerous and independent and offset each other. The price may fluctuate, but mostly in a narrow band. Term prices and spot prices complement one another, one lending stability, the other flexibility. But there are no more effective term contracts, because producing nations cannot be held to any contract, either for exploitation or for production. Everything is short term and anything can happen. The OPEC ministers will inevitably make mistakes, which can be tremendous in their consequences. This instability is in addition to the always-good odds on wars and revolutions noted earlier. The most likely prospect, therefore, is continued instability of price and supply as OPEC members and associates try to keep managing the markets.

Results of a Large Drop in Oil Prices

What if OPEC falls off the cliff and the price drops to somewhere near the competitive level? This small probability looms more important in the longer term.

I cannot believe that the consuming nations will dare go back to the vanished world of 1970, before the producing nations learned by experience what prodigious results a world oil monopoly could achieve. For the sake of security, internal price levels will need to be maintained, while imports from OPEC will still be considerable. There will be obvious temptations to get export advantages from using cheap energy, but if agreement among OECD members could not be reached, there would probably be rebates for exporters.

A much lower price for OPEC oil would, however, greatly *expand* supply and make it much more secure. In such a scenario, the Persian Gulf war would flicker out for lack of money to buy expensive hardware, quickly restoring some 5 million bpd of production within perhaps two years and, what is equally important, speeding up exploration in both Iran and Iraq.

But more oil development in those two countries would be only the beginning of a reversal of post-1973 trends. Lower prices would stimulate oil exploration and development in other cartel nations, just as

higher prices have slowed it. Confronted with lower prices, Saudi Arabia would dust off its 1973 plans to expand output to 20 million bpd, because that would be the only way to salvage something from the wreck. The Saudis could offset lower prices to some degree with higher output. This would make it advisable to drill further and appraise the 35-odd fields, out of a total of 50 known, that they do not exploit today. And it would probably lead to a renewed search for new fields.

Lower oil prices would also encourage Venezuela to tackle the Orinoco heavy oil belt, where there are potential reserves greater than the rest of the world put together. The Venezuelans have learned during the last few years that the belt also contains large deposits of conventional oil, exploitable more cheaply than heavy oil. (For some indication of heavy-oil costs, see below.) Other producing nations would mount their own exploration booms, some of them possibly even inviting back some Western companies as their sense of urgency grew. And so it goes.

Oil is a limited resource. But the only meaningful question is, Where are the limits? Given competition, we would find out in time and make an orderly transition to the post-oil world, which is still many decades away. There would also be no more problems of security of supply. But the prospect of a worldwide competitive oil market seems rather remote for the present.

Official opinion in the OECD nations, as voiced by the chief OECD economist, is that a decline in oil prices would be a bad thing for the economies of the oil-importing nations because it would lower exports to less-developed economies, including those of OPEC.[11]

Perhaps a Brazilian ought to explain the effect of high oil prices on his country's purchases of non-oil products. Or perhaps an Indian, now breathing much easier because "only" 40 percent of Indian export revenues had to be spent for oil this year, as compared with 70 percent two years ago. The important fact is that the fear of lower prices dominates official thinking in the OECD countries. The reason hardly matters; the belief does. The ruling consensus is well stated by Nicholas Kaldor:

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[11] "The ensuing fall in OPEC demand for OECD exports would probably outweigh advantages of cheaper oil that would help further lower inflation rates, [the] chief OECD economist believes. The problems that a price drop would bring are already obvious...[Hopes for recovery] were set back by tumbling demand of OECD goods and other developing countries." ("OECD Sees More Harm than Help in Oil Price Drop Now," *Petroleum Intelligence Weekly*, 3 January 1983, p. 2).

> [The] threat of a collapse of oil prices due to reduced demand... was rightly received with a great deal of misgiving, even by the large oil-importing countries: since they realized that in the long run they are likely to fare worse under a regime of fluctuating oil prices than under a regime of stable prices, even though the latter would be a relatively high one in terms of industrial goods.[12]

Lord Kaldor neglects, as these arguments always do, even to hint when the price would ever be high "enough". And with regard to stability, he is in perfect disagreement with the facts. But there is no reason to think he misstates the prevailing opinion.

The World Setting and Energy Policy

A number of unpleasant things can happen in the short term, and some almost certainly will, to cut down supply and send prices quickly upward.[13] The only means to security is in a strategic reserve, its contents freely available at all times, at current spot prices.[14] I will limit my discussion here, however, only to what is likely to happen to prices once they settle back from temporary fluctuations.

Prices might be held back from falling, because it would pay to do so in the short term, and the cartel cannot afford to think very far into the future. Permanent price increases on the scale of the past, however, seem out of the question. In terms of up-side risk, then, there is a high probability of a small price increase. There is also a small probability that the price will fall toward the competitive floor — perhaps one-fifth of the current level — though one can only speculate about how close it would come. And if the North American governments intervened, as I expect they would, to keep internal prices somewhere near their present level, that would keep internal production going and let the full force of reduced demand fall on the exporting nations.

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[12]Nicholas Kaldor, "The Role of Commodity Prices in Economic Recovery," *Lloyds Bank Review* (July 1983), pp. 21-34.

[13]In appraising the Arab-Israeli conflict as a danger to oil supply, the Saudi action is decisive, and we now have two lessons. In 1973, though the Saudis cut output to make a political point, there was also great gain in reducing output, and they did so. In 1982, though there was worldwide outrage over the Israeli invasion of Lebanon, there would have been economic loss in cutting output. The Saudis never stirred.

[14]"Security of Supply," *Energy Journal* (April 1982).

Thoughts on Canadian Policy

What is a sensible policy rule for anyone who must live in such a market? I will permit myself two general comments. First, Canadian governments own the minerals in the subsoil and need to act like wise trustees on behalf of present and future generations of Canadians. The key question is, At what rate should future oil and gas revenues be discounted? For a private trustee — of a hospital, university, or family — the financial markets yield a tolerably clear answer: assuming the ownership of a bundle of diversified assets, revenues from oil or gas properties in the bundle should be discounted at 10-12 percent per year. A barrel sold today is twice as valuable as one sold 7-10 years hence. I do not think a public trustee should calculate very differently. Doing justice among generations or preferring current to future consumption are problems we do not reach. They are preempted by the fact that oil and gas are risky assets that are becoming more, not less, risky.

Second, Florence Nightingale transformed hospital practice by the following rule: whatever a hospital does, it should not spread disease, and it should not make the patient worse than if he had not entered. Try not to make things worse. Resist the temptation to *do something*, anything, just to be seen doing it.

There is one corner of the world energy market where Canadian and U.S. policies really make a difference. One of the greatest follies the United States ever committed was to put price ceilings on natural gas. It was done to avoid the "injustice" of higher gas prices, which, if it means anything, means the transfer of income from lower- to higher-income groups. But that excuse will hardly do. Two-thirds of gas produced is sold to business firms. The rest is sold to consumers in all income brackets. In order to do a negligible bit of good to a few, we spread largesse thinly over all, and generated a huge excess demand that speedily became a terrible "shortage" of gas, to be warded off somehow, whatever the cost.

The full force of the excess was channeled into the small amount of gas that was exempt from regulation. Particularly after 1978, this was very deep gas and imported gas. At a time when domestic gas sold at the wellhead for less than U.S.$2 per mcf, exempt gas was going for as high as U.S.$9 per mcf and even higher if one were to put a value — as should have been done — on the "take-or-pay" obligation.

Canadian and Mexican gas was admitted at something under U.S.$5 per mcf. But these two countries were aggrieved — quite justly, in my

opinion — because their gas was just as good as deep gas or liquid natural gas and far more secure than supplies from Algeria. Where Canada and Mexico erred, however, was in not seeing that the high prices were quite artificial — the result of regulation — and could only hold briefly for a small amount of gas at best. Instead of making useless, if valid, arguments about fairness, they should have asked themselves simply, "What's best for us?" The question needs to be asked again.

As gas demand slumped in the United States, the market for expensive gas evaporated. Much gas is being sold today because the perceived "shortage", and the limits on price, led to sweetening the nonprice terms of new contracts for exempt gas, chiefly increasing the obligatory take-or-pay percentage. These hidden costs burst into view in 1981-82. Thus, high-cost gas preempts the market from low-cost gas. Laws intended to keep the price below the competitive level now act to raise it above that level.

The market-clearing wellhead price in the United States is today somewhere in the neighborhood of U.S.$3 per mcf. That is the maximum allowed on certain favored types of "new" gas, and supply exceeds demand at that price. Nobody doubts that it would be very profitable for Canadian gas producers to prove up large amounts of new gas reserves and enter into long-term contracts at that price. But the Canadian government will not permit it. It is, in effect, gambling on a long-term price rise and betting also on its foresight being better than that of private gas producers. Three years ago my former student, Dr. Michael Telson, warned the Canadian government that its hopes were illusory.[15]

Even assuming the government is right about a price increase, the question is, How much and how soon? Take the consensus view as stated by the World Bank. By 1995, the price of oil will be 20 percent higher than the 1981 peak. A little arithmetic shows that this amounts to an annual rate of increase of 3.4 percent between 1983 and 1995.[16]

Assume that gas will rise at the same rate as oil. This is an unreasonably favorable assumption, because gas is not a substitute for oil in what will increasingly be its most profitable use: motor gasoline.

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[15]Paul Taylor, "U.S. Won't Buy Unlimited Gas, Analyst Warns," *Globe and Mail* (Toronto), 17 February 1981, p. B2.

[16]The 1981 peak was U.S.$34 — or U.S.$36 in 1983 prices, measured by the GNP Implicit Price Deflator; an increase of 20 percent would be U.S.$43.24. A move from the actual price of U.S.$29 in 1983 to U.S.$43.24 over twelve years amounts to 49 percent, or 3.38 percent per year.

But let that go. To keep the gas in the ground is to invest it for the sake of a target return of 3.4 percent. That might be appropriate for a very safe investment. It surely makes no sense for anything as risky as oil or gas, when the current price rests on the uncertain luck and management of the cartel.

Canada's choice is between selling no gas at a high price and much gas at a lower price. If the United States abolished gas price ceilings, that choice would be too clear to miss. But if Canada did away with the floor price and put no obstacle in the way of new short- or long-term contracts, that would help the current muddle on gas policy in the United States.

Yet, the present is an unusually good time for Canada and Mexico to move, since the old, rigid price structure in the United States is visibly and audibly breaking apart. Gas is being sold on short-term contracts and we may, before long, see a rational structure of sales, from short- to long-term, at prices reflecting relative supply and demand.

Some quiet, unpublicized meetings between Canadian and Mexican representatives might lead these countries to do good to their neighbor while doing well for themselves. (The only injured parties would be the Persian Gulf producers, who would lose even more exports.) Unfortunately, if each side waits for the other to make the first move, both may wait quite a while.

A final note on a topic that could be of major importance: heavy oils. In 1978, Imperial Oil Limited filed a plan for exploiting the Cold Lake deposit, putting their own money into a project for which they hoped to obtain the world price, then U.S.$12.50 per barrel — in current terms nearly U.S.$18 per barrel. The price, however, was not assured and the claims of the federal and Alberta governments to a "fair share" of the economic rents added up to more than 100 percent.

The plan has now been revived, on a painfully smaller scale, in modules each only about one-fifteenth of the size of the original plan. The cost is, therefore, much higher than in the original plan, but the risk of either government becoming somewhat too eager to assert its just rights is much less. Moreover, the heavy oil extracted will not be upgraded, but mingled with condensate into a pipeline to be shipped out. It is obvious, even from the scanty data in the public record, that the cost, assuming an adequate return on investment, is below U.S.$10 per barrel, albeit for a very low grade of crude oil which will fetch a very low price

relative to most others.[17]

Two important conclusions may be drawn. First, at current prices, heavy-oil production is highly profitable, excluding taxes. The 1978 project would have been even more profitable, and both time and money have been lost. One can only hope that the lesson has been learned, that governments should not try to take more than there is to be taken, and that they should permit rapid exploitation.

Second, the Venezuelan heavy-oil deposits are much larger and lower-cost than those in Canada. If the day ever comes that the world oil market lapses into competition, and if new conventional oil reserves really become much more expensive, the present discounted value of the future heavy-oil price would set the price ceiling. Those who enjoy manipulating equations may discount this "backstop resource" from the date of its inception down to the date of calculation, to see the competitive ceiling on price. But it seems to be a long time away.

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[17]A rule of thumb is to multiply the investment per initial daily barrel by a factor of .00074. This would represent a fairly risky rate of return of 15 percent per year, a decline rate of 7 percent, and operating costs of 5 percent. Each increment requires Can.$150 million to product 9,450 bpd (*Oil and Gas Journal*, 12 September 1983, p. 67). The investment per daily barrel would be approximately Can.$15,900, and the cost per barrel would be Can.$11.75.

3

Canadian Energy Policy after 1985: Lessons from the Present[1]

Leonard Waverman

Introduction

The National Energy Program (NEP) of 1980 had three objectives: energy security or the elimination of oil imports by 1990; fairness in both energy pricing and revenue sharing by ensuring that all Canadians and the federal government receive equitable shares in the revenues of the oil industry; and Canadianization of the petroleum industry, to be achieved by reducing foreign ownership in the industry to 50 percent by 1990.

Dasgupta and Heal, in the introduction to their important book *Economic Theory and Exhaustible Resources*, state:

> The efficiency with which a market system allocates exhaustible resources between competing uses at different dates is probably the most important single aspect one might wish to analyze. We may be more concerned to achieve a sensible allocation of our oil stocks between present uses and those a generation hence than we are to achieve such a balance for our present stocks of consumer durables; perhaps the reason is that we expect to be able to make more of the latter at future dates if the need arises. *Obtaining the correct intertemporal balance does seem to be the crux of the 'problem of exhaustible resources' as usually viewed by the public and by policy makers* (emphasis added). Asking whether the market system will strike such a balance takes us into the domain of intertemporal welfare economics. Again, the answer depends very much on the institutional structure of the market system. Certainly one can devise

[1]Peter Dungan ran the scenarios described in the section entitled *Constraints on Future Energy Policy*. I am grateful to him and to André Plourde for helpful suggestions. Campbell Watkins made many wise comments. Any errors are my sole responsibility.

> market structures which will get the balance right, but they are very complicated and rather different from the ones we actually have.[2]

As Robert Solow points out, competitive private resource markets may tend to exhaust a finite stock *too quickly*, suggesting a need for government policy to correct this "tilt" by correcting actual market structures.[3]

The themes of this paper are, first, to assess the "market structure" inherent in past and present Canadian energy policy and to address the market structure appropriate to the future, and second, to examine how actual policies have affected that crucial question of natural resource exploitation: when to produce one's finite resources.

In the postwar period through 1972, Canadian energy policy centered on incentives to increase exploration and discoveries through expanding production, principally through export sales of both oil and natural gas to the United States. These export sales would then have determined Canadian prices unless price discrimination — against Americans or Canadians — was practiced. Internal regulation within the United States lowered natural gas prices below, and raised oil prices above, market-clearing levels, including Canadian officials to regulate the border price of natural gas, but not the price of oil. In addition, two very different market structures developed for oil and gas. In the oil market, spot and long-term sales coexisted, pipelines were common carriers, and competitive markets developed. In the natural gas market, rigid, long-term contracts evolved, with pipeline operators buying and reselling natural gas. Few sales of natural gas were made between ultimate users and producers and there was little development of spot or wholesale markets.

In the ten-year period 1973-83, Canadian officials decoupled domestic oil and natural gas prices from world (opportunity cost) levels, reduced exports of light oil to zero, introduced export taxes on oil, and engaged in price discrimination against U.S. customers on natural gas sales. This decoupling of the Canadian from foreign energy sectors was coincident with a change in federal objectives, from one of expanding hydrocarbon production through exports to one of reallocating the economic rents from domestic oil and natural gas production away from producers and producing provinces. Implicitly, by reducing oil exports and raising natural gas and oil prices in export markets, energy policy did tend to

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[2]P. Dasgupta and G. Heal, *Economic Theory and Exhaustible Resources* (Cambridge: Cambridge University Press, 1979), p. 5.

[3]R.M. Solow, "The Economics of Resources or the Resources of Economics," *American Economic Review* 64 (May 1974): 1-14.

shift production from the present to the future. Since world oil prices rose in real terms over this same period, that policy of tilting production was sensible. Maintaining domestic Canadian oil and gas prices below world levels, however, increased consumption in the 1970s over what it would have been at world price levels. The "made-in-Canada oil price" policy, therefore, tilted production to the present, which was not the corrective policy needed.

There are three types of strains now evident on Canadian energy policy. The first of these emanates from the explicit forms that policy took: the NEP and the Energy Pricing Agreement of 1981. Their explicit forms are described and criticized later but, basically, any policy or any administered price set either by political dominance or by negotiation between two rivals will turn out, almost by definition, to have major faults, especially in an uncertain world. A second strain on Canadian energy policy arises as Canadian energy prices reach (or exceed) world levels — the kind of strain that appeared in the 1950s and 1960s. In deciding on appropriate energy export levels to the United States, how do Canadian officials deal with the impact that domestic U.S. market structures and energy prices will have on those in Canada? There is no doubt that the current development of sophisticated spot and wholesale gas markets represents a fundamental change in the U.S. natural gas market. Is this market structure more appropriate than the existing structure to solve the intertemporal production problem noted above? The third strain on Canadian energy policy is that developed by the interrelationship between energy production and consumption on the one hand, and the remainder of the economy on the other. This interrelationship — the impact, for example, of energy prices on inflation or on the balance of payments — makes it impossible to develop an energy policy, or even a set of energy policies, in a vacuum.

The second section of this paper discusses the development of Canadian energy policies in the 1947-72 period; the third section critically examines the NEP; the fourth section analyzes the constraints on energy policy, especially those resulting from any significant move to domestic self-sufficiency in oil; the final section examines future policy, concentrating on natural gas markets.

Canadian Energy Policies before 1972

The modern Canadian petroleum industry began in 1947 with the Imperial Oil discovery at Leduc, Alberta. It is a fair generalization to

suggest that, until 1972, federal and western provincial energy policies were concerned with ensuring adequate incentives for exploration and production.[4] In the context of an intertemporal production balance, federal policies had the effect of shifting production to the present and away from the future. These policies to expand exploration and production considered a special Canadian presence in the petroleum industry unimportant. Revenue sharing, in the pre-1972 decades, revolved around the federal government's conscious reduction of income taxes, thus shifting the distribution of revenues away from the federal government and towards the petroleum industry and the producing provinces.[5]

Canadian energy policy in the 1947-72 period had six essential elements:

- federal income tax reductions through fast write-offs of many assets; federal acceptance of payments — royalties — to provinces as deductible for federal income tax purposes and an unearned depletion allowance;
- federal intervention in domestic markets both to prevent the importation of any foreign natural gas and to limit oil imports to the area east of the Ottawa Valley;[6]
- federal intervention, by way of the National Energy Board (NEB), in constraining natural gas exports to quantities deemed surplus to future Canadian requirements;[7]
- federal intervention, partially by way of explicit subsidies, to ensure the construction of a transcontinental domestic natural gas pipeline to join western Canadian producers and eastern Canadian consumers;[8]
- federal government intercession with the United States to prevent restrictions on Canadian exports of both natural gas and oil to that country; and,
- provincial policies aimed at maintaining high cash flow to producers;

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[4]The domestic natural gas market was protected by limiting natural gas exports to quantities deemed surplus to future Canadian requirements.

[5]See R.M. Hyndman and M.W. Bucovetsky, "Rents, Rentiers, and Royalties: Government Revenue from Canadian Oil and Gas," in E.W. Erickson and L. Waverman, eds., *The Energy Question: An International Failure of Policy*, vol. 2 (Toronto: University of Toronto Press, 1974), pp. 191-214.

[6]See J.G. Debanné, "Oil and Canadian Policy," in Ibid., pp. 125-147.

[7]See G.C. Watkins, ed., *The Canadian Oil Industry: An Analysis* (Study commissioned by Shell Canada Limited, Toronto, 1984).

[8]See L. Waverman, *Natural Gas and National Policy: A Linear Programming Model of North American Natural Gas Flows* (Toronto: University of Toronto Press, 1973).

some of these policies, such as prorationing, helped maintain price levels.[9]

This Canadian energy policy was based on the notion that the small size of the domestic Canadian market for petroleum products placed too low a limit on the amount of production from domestic energy resources. Export of oil and natural gas into the U.S. market was viewed as an important ingredient in maintaining high rates of production and exploration. This reliance on the U.S. market had a number of consequences. First, high rates of exploration and discovery required large amounts of imported capital, thus ensuring a high degree of foreign control over the Canadian petroleum sector. Second, in order to receive preferential treatment in U.S. oil markets and to secure access to these markets for large amounts of Canadian oil, Canada could not engage in price discrimination against U.S. customers. As a result, domestic U.S. prices for oil, which were held unnaturally high in the 1950s and 1960s by a combination of U.S. policies, became the prices for Canadian domestic oil. It is important to note that, prior to 1974, the federal government required no export permits for oil exports from Canada, nor did it levy an oil export tax on oil, nor did it place restrictions on oil export prices.[10] Third, domestic U.S. policies held natural gas prices below market-clearing levels.[11] As a result, the prices on early export sales from Canada were below domestic Canadian price levels. Canadian authorities intervened so as to place a floor on natural gas export prices.

In summary, the postwar period through 1972 saw the growth of federal and provincial intervention in the energy sector so as to *expand* production. The reliance on exports to the U.S. market for the development of Canadian hydrocarbon reserves had opposing influences on Canadian domestic prices for oil and gas: raising oil prices and threatening to lower prices for natural gas. In 1971, 57 percent of Canadian oil production and 47 percent of gas production flowed to U.S. markets; the federal government received some 10 percent of the revenues of the oil and gas industry; and foreigners owned 75 percent of the production sector. Then came the events of 1973.

[9]See G.C. Watkins, "Canadian Natural Gas: Problems and Prospects" (Paper presented at the Massachusetts Institute of Technology Conference on "The Future of Natural Gas," Cambridge, Mass., 14–15 March 1983).

[10]See P.G. Bradley and G.C. Watkins, "Crude Oil Pricing in Canada," in Watkins, ed., *The Canadian Oil Industry*, p. 102.

[11]See P.W. MacAvoy and R.S. Pindyck, *The Economics of the Natural Gas Shortage* (Amsterdam: North-Holland, 1975).

The Ramifications of 1973 and the National Energy Program

The abrupt oil price increase in 1973 orchestrated by the Organization of Petroleum Exporting Countries (OPEC) shocked then-existing Canadian energy policy to its foundations. A continuing reliance on exporting $0.26 per mcf natural gas and $2.30 per barrel oil to the United States seemed insensible. The vast new wealth created by large price increases in oil and natural gas created the need for at least a reexamination of the revenue sharing of hydrocarbon proceeds in the newly perceived world of energy scarcity. This revenue sharing had two components: the distribution of rents, first, among Canadians, and second, between Canadians as a group and other nationals.

In response to the new international energy environment, the federal government adopted a number of changes in energy policy over the last ten years. These changes included: introducing and maintaining a domestic price ceiling on oil below the world oil price level; constraining domestic natural gas prices; implementing an export tax on oil equaling the difference between the domestic Canadian price and the price in certain U.S. markets; phasing out the export of light crude oil to the United States beginning in 1974;[12] and introducing a series of tax revisions designed to enhance the federal share of oil and natural gas revenues.

These policy changes, as it turned out, were only the first part of a comprehensive energy program: the NEP, unveiled in October 1980. That program, in conjunction with the 1981 Energy Pricing Agreement between Ottawa and Alberta, represented the new energy policy. The NEP has since been updated twice by the federal government, in June 1982 and in the April 1983 federal budget, and once by the Alberta government, in April 1982.

The essential features of the NEP and of the September 1981 Energy Pricing Agreement were:[13]

- The imposition of an average price for conventional crude oil increasing by $2 per barrel per year between 1981 and 1983, then escalating to reach a "reference price" of $38 per barrel in 1980 dollars. That average price for conventional oil was made up by a price for "old" oil — oil

[12]The federal government is reintroducing some exports in 1984.

[13]This section is taken in large degree from J.F. Helliwell, M.E. MacGregor, and A. Plourde, "Changes in Canadian Energy Demand, Supply and Policies, 1974-1986," Resources Paper no. 92 (Vancouver: University of British Columbia, Department of Economics, Programme in Natural Resource Economics, 1983).

discovered before 31 December 1980 — to be held at a maximum of 75 percent of the landed price of imported oil, and "new" oil, which was to receive the New Oil Reference Price (NORP), rising quickly to 100 percent of the imported oil price. Synthetic oil was to receive the NORP, but received $38 per barrel immediately; oil from tertiary recovery received only $30 per barrel.

- The setting of the price of natural gas at the Alberta border. The price was to rise by $0.25 per mcf increments every 6 months.
- The introduction of an Incremental Oil Revenue Tax (IORT), through which any "extra" producer revenue on "old" oil was to be taxed at an incremental rate of 50 percent.
- The levying of a charge on all oil users to eventually cover the costs of subsidizing imported oil and the differential price for synthetic oil. This Petroleum Compensation Charge (PCC) was initially set at $5.50 per barrel in October 1980 but was raised in 1981 so that oil users paid all the costs to import oil.
- The imposition of a new tax, the Natural Gas and Gas Liquids Tax (NGGLT), on all natural gas produced, at an initial rate of $0.30 per mcf, rising to $0.75 per mcf in 1973. This tax was to be adjusted so that natural gas prices would not exceed 65 percent of the city-gate cost of crude oil in Toronto.
- The levying of an *ad valorem* Petroleum and Gas Revenue Tax (PGRT), set at 12 percent in 1981, on all petroleum and natural gas revenues, after deduction of current operating expenditures.
- The replacement of depletion allowances by a system of taxable grants, known as the Petroleum Incentives Program (PIP), designed to cover the costs of exploratory wells. These PIP grants are an increasing function of the degree of Canadian ownership and favor exploration on the Canada Lands.
- The reservation to the Crown of a 25 percent interest in the Canada Lands and the stipulation that a producer on the Canada Lands be at least 50 percent Canadian-owned.

These features signaled a number of mechanistic beliefs: that world oil prices would continue to escalate to reach a landed price of Can.$54.50 per barrel in 1983 (the price was actually $39 in 1983); that vast energy wealth resided in the Canada Lands, that is, the frontier rather than in conventional deposits such as in Alberta; that the essential problem was the division of the pie while ensuring that gross inefficiencies did not exist; that the prices of two commodities, oil and natural gas, could be set

for many years in the future, disregarding demand and supply conditions; and that the correct policy was to encourage rapid exploration of frontier — and federal — lands at the expense of lower-cost conventional lands and that a "cost plus" agreement — a PIP grant — was an efficient way of ensuring that such exploration took place.

The last two years have placed enormous strains on the NEP. A number of general revisions have been made, such as reducing the PGRT, temporarily shelving the IORT, redefining "new" oil — now defined as oil discovered after 1 January 1974 — and reviewing the NGGLT. In addition, new agreements have been made on a specific ad hoc basis for particular projects, such as those in Cold Lake and Norman Wells. The federal government has been quick to defend the "general" objectives of the NEP, while agreeing in principle with its critics that the future should not have been expected to be certain.

Objections to the NEP can be divided into two distinct categories: that the *goals* of the NEP are incorrect or inconsistent with optimal resource extraction policies, and that, though the goals are socially correct, the *methods* chosen to fulfill the goals are inefficient and wasteful.

It is my view that the goals of the NEP are basically short-sighted — that is, they are inconsistent with optimal resource extraction — and that, in addition, some of the methods used to implement these goals are inefficient. Both the goals and methods of NEP are, however, a natural outcome of the realities of Canadian politics. The overlapping taxation powers of the *British North America Act* made the division of revenues into a poker game. Provincial rights to internal resource development and federal jurisdiction over interprovincial and international trade guaranteed fundamental negotiations between the two opposing powers over resource development.

Any policy that is ultimately decided by relative power and any price that is determined by political negotiation has, by definition, a number of fundamental flaws. These flaws consist of politically expedient or politically dominant outcomes; log-roiling outcomes (a clause for you, a clause for me); outcomes that are etched in granite; and the need to return periodically to the negotiating table.

The NEP was a master poker hand designed to force the conclusion of the game and to ensure the federal government's desired distribution of the stakes. Policy devised as a poker hand has as its intended outcome the entrapment of a rival — a politically dominant outcome. This is not necessarily the best policy from a true social viewpoint. The Energy Pricing Agreements resulted from a series of negotiations between rivals,

each attaching a specific clause exacted in payment for allowing the rival's clause to stand — that is, log-rolling. As a result, the series of differential prices boggles the imagination. Moreover, policy determination as a poker game, or as an outcome from rival negotiation, must attempt to cover all existing and potential conditions. But any new condition, one not foreseen in the poker game, requires the players to rejoin the game — an arduous process.

The NEP has one basic goal: division of the pie. "Fairness" in pricing is just one means of distributing economic rent — to consumers through "fair", that is, not market-clearing, levels. Self-sufficiency is another means of income redistribution — ensuring the use of Canadian oil and natural gas. Given the realities of the distribution of the poker hands, the NEP is a natural *short-term* policy. The question of rent division has to be solved, and the NEP does do that, although perhaps not to the satisfaction of all parties. The world has changed, however. The question of rent division having been settled, we must return to the central question: the issue of optimal resource extraction over time.

What of the methods used in the NEP to achieve its desired goal? The elaborate setting-out of the future price paths for various types of oil — new, old, tertiary, and synthetic — was doomed to an early failure since neither the future nor OPEC are party to the NEP. One of the essential features of any market system is price flexibility — price is the signal to consumers and producers alike to use and produce efficiently. The NEP's rigidities in prices, price changes, and, most importantly, relative prices between natural gas and oil are exactly the wrong market structure. It is an attempt to substitute administered rigidities for an effective market system. In the pre-1973 period, incentives for exploration were given through income tax reductions. This incentive policy had three problems. First, fast write-offs and depletion allowances are only valuable to companies with taxable income, thus potentially penalizing small Canadian firms. Second, there was no necessary relationship between taxable income, the value of the depletion allowance, and actual future exploration. Third, tying incentives for exploration to taxable income increased the incentive to produce, thus tilting production towards the present — the wrong social outcome.

The PIP grants of the NEP were then designed to induce exploration, but without the negative features of depletion allowances. These PIP grants, however, have three unfortunate features. First, they are far too large. The after-tax exploration costs of some firms can be close to zero or even negative. The efficiency losses of having firms explore with five-

cent dollars have become obvious to the federal government as PIP grants have escalated beyond expectations, both on a per well basis and in total. Second, the PIP grants make a distinction between foreign and Canadian firms. I know of no efficiency gains from inducing small Canadian firms to explore in the Arctic, especially when they will not then have the expertise to produce.[14] Third, the PIP grants give differential incentives to explore in the Canada Lands, thus at the margin redirecting exploration dollars from conventional lands to the frontier.[15] This incentive is inefficient and perverse in terms of optimal extraction policy; society wants to find and produce the lowest-cost oil first, and then the more expensive oil. The PIP grants are best considered as one of the instruments designed to reallocate rents toward Canadian firms and away from Alberta, and are an inefficient instrument for that purpose.

The NEP was a necessary once-and-for-all policy statement. Now that the statement has been made, it is time to return to the essential problem of resource extraction: the "correct" time profile of oil and natural gas production.

Constraints on Future Energy Policy

A number of important factors constrain both the goals and the specific workings of energy policy. Before turning to the desirable shape of energy policy after 1985, we must first examine these constraints. The first factor is the interaction between energy demand, price, domestic supply, imports, and exports. For example, maintaining a low domestic price lowers exploration and new reserve additions, exaggerates demand, and increases imports. The second factor is the interaction between the energy microenvironment and the macroeconomy. A large upward shock in the oil price, for example, passes directly into inflation, lowers growth, and, by radically altering the terms of trade, worsens the balance of payments on current account.[16] The third factor is the interaction between energy prices, energy supplies, and the government's budget. Energy taxes form a significant portion of the government's budgetary

[14] I am indebted to André Plourde for this point.

[15] Alberta has reacted by reducing royalties to induce exploration within that province, and with no distinction between Canadians and foreigners. See A.M. Kahane, "1982 Changes in Canadian Energy Policy: The Alberta Royalty Changes and the NEP Update," Resources Paper no. 91 (Vancouver: University of British Columbia, Department of Economics, Programme in Natural Resource Economics, 1983).

[16] This is true for any net energy importer.

position, and changes in policies or in exogenous factors such as the world oil price have important ramifications on the government deficit.

In order to highlight these factors and to determine how they interact to constrain effective policy, we undertook several simulations with the FOCUS model of the Canadian economy over the 1984-85 period.[17] These simulations should *not* be viewed as forecasts or projections of the Canadian economy under alternative exogenous forecasts or alternative policies. We were, instead, attempting to show the *impact* of specific policies or specific exogenous shocks on the Canadian economy so as to examine the *constraints* on Canadian energy policymakers. In fact, several of our simulations led to implausible results — balance of payments deficits or surpluses that would be impossible to maintain. These results should not indicate to the reader that either the model or the simulation was implausible but that the energy policy being modeled itself led to impossible strains on the economy, requiring either compensating changes in other policies *or* a reworking of the energy policy.

Three sets of scenarios were run to delimit the constraints on energy policy. In the first two sets of simulations, we attempted to implement one goal of the NEP: oil self-sufficiency. Self-sufficiency can come about either through sufficient supply increases or through sufficient demand decreases to render imports unnecessary. Supply-encouraging or demand-discouraging policies have very different impacts on the Canadian economy, and the simulations of both sets of specific policies call into question the announced policy goal of self-sufficiency by 1990. A third set of scenarios examined the impact on the federal and provincial governments, the energy sector, and the overall economy of a once-and-for-all U.S.$10 decrease in the world oil price.

The energy sector assumptions contained in the base case were as follows:

- A world oil price projection based on Stanford's Energy Modeling Forum. This was taken to be an average of the prices that would result from "Minimum Duration Glut" and "Maximum Duration Glut" scenarios.
- The price of "old" domestic oil would rise to 100 percent of the world price from 75 percent by 1988.
- The price of natural gas would rise to 75 percent Btu parity with oil in 1984-85.

[17]An Appendix to this paper, detailing the simulations that are discussed only briefly here, is available separately upon request from the C.D. Howe Institute.

- Domestic demand for oil would level off in 1986; demand for gas would continue to rise.
- Domestic oil supply would gradually fall until Hibernia and one medium-size tar sands plant come on stream in the 1990s.
- Oil self-sufficiency would not be achieved in 1995.

Self-Sufficiency in 1990

In our model, we ran a number of simulations aimed at implementing the NEP policy of self-sufficiency by 1990. In the first case, domestic oil output was augmented by a simulated crash construction program consisting of three Alsands-like synthetic oil plants, beginning in 1984 at one-year start-up intervals, each plant taking four years and $6.25 billion (1982 dollars) to construct. This increased construction raised real GNP — 1 percent in 1986 — and slightly increased prices and employment levels as well. We found, however, that the important impact of these projects on the Canadian economy only came about once construction was completed and production began. When the exchange rate was constrained not to move from its base case levels, real GNP *fell* because of the repayment of interest on the foreign money borrowed to build the plants. The government deficit was reduced by $2-3 billion per year, beginning in 1992, mainly through increased revenues from increased domestic oil production. The major effect, however, was the elimination of expensive oil imports, leading to *large surpluses* on the net balance of payments account (current and capital). These surpluses were a signal that an energy policy of oil self-sufficiency creates a need to adjust other government policies. This surplus in the net balance of payments could be reduced by allowing the Canadian dollar to appreciate or by reducing Canadian interest rates. Appreciation of the Canadian dollar "balanced" the balance of payments by encouraging other imports or by discouraging exports. Our simulations indicated that this exchange-rate appreciation not only *lowered* GNP but also *increased* the government deficit, surely high social costs of a goal of oil self-sufficiency.

When the balance of payments was "balanced" by monetary policy, real GNP increased as a result of interest rates falling so as to stimulate capital outflows from Canada. While the general price level remained somewhat high — an overhang from the "build" phase — the government deficit fell by $2-3 billion (real) per year in the 1991-95 period. Thus, oil self-sufficiency through domestic supply additions positively

stimulated the Canadian economy only if monetary policy was relaxed.

A second set of experiments examined the movement to self-sufficiency through reducing the domestic demand for oil. Assuming short- and long-term price demand elasticities of -0.1 and -0.5 respectively, and short- and long-term income demand elasticities of 0.3 and 0.6 respectively, an excise tax was added to the retail price of oil products to reduce demand. When we assumed that there were no adjustments in other government policy, the reduction in oil demand had a drastic impact on the net balance of payments, with improvements reaching $22 billion in 1995, an impact that would not be sustainable. Domestically, the excise tax acted so as to *reduce* real GNP and initially *raise* the average price level. Not surprisingly, the budgetary position of the federal government — the assumed recipient of the excise tax — was enormously improved.

Clearly, the goal of obtaining self-sufficiency through increasing excise taxes to cut domestic oil demand would be a very costly social policy. We simulated several ways in which the federal government could counteract the negative effects of the excise tax and combat the balance of payments surplus: through monetary policy — by reducing interest rates — and through compensating fiscal policy — by returning most of the revenues obtained by the incremental excise tax on oil to consumers through personal tax reductions. Basically, an excise tax increase would be recessionary and inflationary; to offset these negative effects would require very careful adjustment of other federal policies.

These simulations of a policy designed to achieve oil self-sufficiency by 1990 showed the following important (and perhaps obvious) points. First, such a goal could have negative effects on the economy unless other federal policies were adjusted to compensate for this particular energy policy. Second, the major impact on GNP of adding three tar sands plants by 1990 occurs when they become operational, not when they are built. Third, the major impact of any policy of oil self-sufficiency is to eliminate large volumes of expensive imports. This tends to appreciate the Canadian dollar unless monetary policy lowers domestic Canadian interest rates. Finally, attempting to decrease demand for oil by increasing oil consumption taxes has, by itself, recessionary and inflationary impacts.

The key, and again obvious, finding is that any energy policy such as oil self-sufficiency is constrained by a host of factors. Energy policy can neither be designed nor be made to operate in a vacuum.

An Oil Price Shock

To further delimit the constraints on Canadian energy policy in the future, we ran a set of simulations decreasing the world price of oil by U.S. $10 per barrel in 1984. Thereafter, the price of oil rose as in the base case. Prices of Canadian natural gas exports were assumed to fall by the same amount on a 100 percent Btu parity basis. Domestic demand for oil was adjusted using the set of demand elasticities described in the previous section. As a result of the oil price decline, we initially assumed the cancellations of Hibernia development, some tertiary recovery, and the one tar sands plant scheduled to be constructed in the early 1990s. The most important assumption we made was that the oil price decline would stimulate U.S. and other foreign real output by 2 percent and reduce foreign prices by one percentage point. In this scenario, and abiding by the Alberta interpretation of the 1981 Energy Pricing Agreement, the price of "old" oil did not fall; the domestic "blended" price did gradually fall to the new, lower world oil price level because the new oil reference price fell, as did "old" oil volumes as a proportion of the total oil produced in Canada.

This simulated fall in the world oil price had the following impacts on the Canadian economy: real GNP rose through an increase in consumption, although investment fell; the aggregate price level fell; and the government deficit increased somewhat — by $2-3 billion in real terms. The major impact of this simulated drop in the world oil price was a substantial worsening of the balance of payments. This occurred because demand for oil products increased and domestic production fell in response to lower oil prices. Even when the Hibernia project was assumed to proceed, the balance of payments — both current and capital accounts — was $15 billion below base case levels in 1995. Obviously, some corrective policy was required. Our simulations suggested that allowing the dollar to float would require a 5-7.5 cent depreciation of the Canadian dollar. GNP would then increase in response, and the price level would rise 2.4 percent above the base level. When domestic monetary policy was used instead of allowing the Canadian dollar to depreciate, interest rates rose — to induce capital inflows — real GNP fell and, while prices did not rise, the government deficit was $4 billion (real) worse in 1995 than in the base case.

The constraints on Canadian energy policy are evident. If the world price of oil were to fall significantly, thus reducing the supply of Canadian oil and increasing the demand for oil, substantial downward

pressure would be placed on the Canadian dollar. The federal government's tax receipts from the oil industry would fall, and so could overall real GNP, unless the government were to allow the dollar to depreciate.

Energy Policy after 1985

Natural Gas Policy

The dilemma of Canadian energy policy is most apparent in natural gas: 30 percent of Alberta's natural gas wells are shut in, at present; 60 percent of permitted export volumes are not being taken; take-or-pay provisions are saddling both U.S. and Canadian pipelines with enormous financial obligations for Canadian gas not taken; domestic demand for natural gas is falling; certain heavy natural-gas-using industries, such as the Ontario nitrogen product industry, are facing severe import competition. John Helliwell has recently suggested that, "The major remaining challenge to pricing policy is to find a corresponding way of making natural gas prices more responsive to the pressures of supply and demand."[18]

While these problems are severe, they are not new. The North American natural gas industry has been in severe disequilibria for the last 30 years! These dislocations, then and now, are the result of inappropriate administered prices and the reluctance of governments to allow new market structures to arise.

There are great differences in the institutional and regulatory treatment of oil as compared to natural gas sales. Oil pipelines are generally common carriers, shipping the oil for the purchaser or seller. Most market transactions for oil are relatively short-lived; it is rare to have long-term purchase and sale agreements. Oil distributors are not regulated, although the tariffs charged by oil pipelines are regulated. Currently, most natural gas purchase and sale transactions are for long periods of time. Because natural gas cannot be distributed locally by a host of competing sellers, natural gas distribution is generally a regulated local monopoly.

Since these natural gas distribution facilities are extremely long-lived, financial markets have, in the past, required these utilities to have long-lived — that is, 15-20 years — purchase contracts to ensure underwriting

[18]J.F. Helliwell, M.E. MacGregor, and André Plourde, "The National Energy Program Meets Falling World Oil Prices," *Canadian Public Policy* 9 (September 1983): 295.

of stocks and bonds. Natural gas pipelines, in addition, are not generally common carriers; instead, they act as intermediaries between buyers and sellers, purchasing gas on their own accounts for resale to gas distributors.

Because of the system of long-term contracts required in the market, the Canadian government has intervened — since 1959 through the NEB — in the natural gas export market, regulating, first, the volume of exports, and then, the price. These points are all key to the present dislocations within gas markets. Since natural gas pipelines and distributors are regulated utilities, it became relatively easy for governments to intervene in pricing. The Phillips Petroleum Company case of 1954 gave the U.S. Federal Power Commission the (unwanted) power to regulate wellhead prices of natural gas in interstate commerce. Much has been written to prove that this price regulation had the effect of lowering U.S. wellhead prices for natural gas below market-clearing levels.[19] It also had the initial effect of lowering Canadian export prices for natural gas to levels *below* those charged in Canadian markets.

The Canadian government intervened in 1967 to set the export price for natural gas at 105 percent of the gas price in Canada adjacent to the export point, thus removing the pressure of low U.S. natural gas prices on domestic Canadian prices. In the late 1960s, export prices for Canadian gas rose because of regulation-induced shortages in U.S. interstate gas markets and the ability of U.S. pipelines to "roll in" the higher cost of incremental unregulated supplies into the average price of gas. With domestic price ceilings imposed in Canada in early 1974 on both oil and natural gas, the export price for natural gas was set by the Canadian government at the commodity Btu value of an equivalent fuel and was unilaterally raised for all U.S. sales. Since both U.S. and Canadian domestic oil prices were below market-clearing levels in the late 1970s, the Canadian government moved to a price for natural gas exports related to the cost of substituting oil imported into Canada for exported natural gas.[20]

This export price hit $4.94 per mcf in April 1981, and though it was reduced to $4.40 per mcf in April 1983, it is higher than the correspond-

[19]See MacAvoy and Pindyck.

[20]W. Foster, K.C. McShane and R.A. Reddick, "Marketing Canadian Natural Gas in the United States," in R.L. Itteilag, ed., *Government and Energy Policy: Proceedings, Fifth Annual North American Meeting [of the International Association of Energy Economists], Washington, D.C., June 9-10, 1983* (Alexandria, Va.: IAEE, 1983), pp. 83-89.

ing Canadian domestic price and appears to be higher than market-clearing levels in the United States, as are a number of domestic U.S. natural gas prices. U.S. utilities and pipelines are abrogating old, high-priced contracts, negotiating new contracts with limited take-or-pay provisions, and inserting "market-out" provisions in new contracts. In addition, buyers are beginning to negotiate directly with producers for short- and long-term natural gas supplies and are using natural gas pipelines as common carriers. Spot and wholesale markets are developing, and there is some possibility of natural gas futures contracts being traded on the New York Mercantile Exchange.

On the other hand, the NEB, in its latest hearings on natural gas exports, suggested that in contracts:

> Desirable features would include high load factor terms, an adequate level of take-or-pay (seventy-five percent of annual contract quantity is considered to be adequate in most cases), with allowance for make-up in the year following expiry of the licence of gas paid for but not taken, and a price for gas paid for but not taken at the prevailing export price.[21]

Undesirable features, according to the NEB, would include refund of take-or-pay or market-out clauses.

It is clear that the NEB, in its 1983 decision, was out of step with reality. Take-or-pay clauses have been shown to force an unacceptable and inefficient division of risk onto pipeline companies.[22] There is no reason for the NEB to oversee contractual terms. This type of regulation, and price regulation itself, is a holdover from an inefficient past in which the absence of markets forced regulatory supervision on contracts and prices. This regulation itself then stifled the development of markets. There is no reason for the regulator to intervene in markets — to impose long-term contracts, for example — if buyers and sellers wish to allocate risk among themselves through short-term market contracts.

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[21]National Energy Board, *Reasons for Decisions in the Matter of...the Gas Export Omnibus Hearing, 1982* (Ottawa, January 1983), p. 51. The Board's current thinking on natural gas exports is reflected in the speech given by its chairman, C. Geoffrey Edge, to the Conference on "Natural Gas North America, Waiting for the Bubble to Burst," sponsored by Platt's Oilgram News, Vancouver, 13 December 1983. In that speech, Mr. Edge suggested that some relaxation of minimum take-or-pay provisions might occur if other provisions, such as a system of demand and commodity charges, protected Canadians.

[22]See P.R. Carpenter, "Field Price Decontrol of Natural Gas, Pipeline Risk and Regulatory Policy," in Itteilag, ed., pp. 148–165.

If Canada wishes to sell large supplies of natural gas in the United States, these sales will be at market rates with a new market structure. As in the 1950s and 1960s, however, lower export prices will tend to reduce domestic Canadian prices. Since the NEP and the 1981 Energy Pricing Agreement consist of an interconnected set of administered rules and prices, lowering natural gas prices would put the entire NEP in jeopardy.

Should Canada export large volumes of gas to the United States? That is the question of optimal resource extraction. If future oil and gas prices are expected to increase at rates less than the real interest rate, such exports make social sense. The question of optimal resource extraction, then, has three parts: first, What is the future path of oil prices?; second, Who knows the future path better, producers or the government?; and third, Are producers' incentives the correct ones for society?

Professor Adelman, in a companion paper at this symposium, argues — cogently as always — that some estimates of the future price of oil twenty years hence show a 3.4 percent annual increase.[23] Such a return is too low to keep a risky asset like natural gas in the ground.

In addition, it is obvious that we ought to assume producers know the future price path at least as well as the government. There are, then, only two reasons for Canadian government intervention in the export gas market: to prevent the domestic price from falling — a poor excuse for intervention — or, in its role as the caretaker of the optimal extraction path, to prevent private markets from producing the resource too quickly.

A cogent argument can be made *not* to export large volumes of natural gas to the United States. Those sales would compete at the margin with high sulphur residual fuel oil in the industrial boiler market.[24] I am not convinced that the long-term equilibrium path of natural gas prices is anywhere near the current short-term disequilibrium path of high sulphur residual fuel oil in certain U.S. regional markets. Moreover, given the political instability of the Persian Gulf, there is some probability that we will soon witness an upward jump in oil prices. I would wait, then, at least several years before selling natural gas at, say, $2.00 per mcf, in order to ensure that this is the social equilibrium price.

What of all the shut-in Canadian gas that was developed in the first place as a response to government policy? Private producers should not

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[23][See M.A. Adelman, "The International Context," in this volume — Eds.].

[24]W.R. Hughes, "Natural Gas Prices Under Deregulation: Lessons of the Boiler Fuel Market," in Itteilag, ed., pp. 55-82.

go bankrupt because of inconsistent and changing social signals. The government should expand its Gas Bank plan, purchasing shut-in gas as a form of strategic reserve against the uncertainties of the future. This policy would guard against future dislocations while fulfilling implicit government promises to producers. At the same time, developments that expand the use of markets in natural gas should be welcomed, not rejected. Short-term contracts and new contractual forms spreading risk among the parties should be developed, not dismissed.

Natural gas policy should then leave contracts and prices to producers and buyers. Correct social policy should assist in developing new market structures, and ensure that neither monopsony nor monopoly power is used. Moreover, the government should act as the guardian of the "correct" exploitation path while ensuring that it itself is not the source of perverse production incentives.

The NEP after 1985

The events of the three years that have followed the introduction of the NEP in October 1980 suggest that a number of changes to Canadian energy policy need to occur. First, it should be able to respond more flexibly to changes in exogenous factors, such as the world price of oil and the international economic climate, that are beyond the control of domestic policymakers. Second, it should be far less directive in terms of guessing where exploration should take place. Third, it should be less dependent on "specific" market inducements, such as PIP grants, and more dependent on "general" market inducements. Fourth, it should be more focused on institutional mechanisms that affect the realities of day-to-day market transactions. Finally, energy policy should be more interrelated to other government policies.

The goal of the NEP — rent collection and division — was crucial in 1975. The government has perhaps an even more difficult task in 1985: *to devise a set of policies that interfere with the market mechanism only when that mechanism tends to overproduce oil, leaving too little for future generations.* In that spirit I would suggest the following specific changes to the NEP:

- Quick movement to world price levels where producers bear the risk of downward price movement and are compensated by receiving a portion of any upward movement. World prices should apply to all oil and natural gas.

- Decoupling of natural gas and oil prices, since the Btu-parity case depends on an incorrect assumption of both perfect substitutability and identical supply-demand relationships.
- Reliance on general tax provisions that require neither renegotiation nor exemption for specific projects and that allow projects to proceed at the margin where the costs — including risk — equal the expected price.
- Reduction in the size of PIP grants or a return to an income-based exploration incentive, allowing a negative income tax.
- Removal of the incentive that pushes small Canadian firms to the riskiest, most expensive projects.
- Adjustment of the exploration incentive system that, at the margin, encourages exploration of the highest-cost resources.

Most importantly, the federal government, or its agency, should take a long-term view of resource exploitation. We, as a nation, have a vast wealth of energy resources. Every energy policy, be it the domestic price level or the amount of PIP grants, is an implicit choice between how much of these resources to consume now and how much to leave in the ground for future generations. This choice is too important to be swayed by partisan politics or short-term considerations. To the words of Robert Solow, "the future may be too important to be left to the accident of mistaken expectations and the ups and downs of the Protestant ethic,"[25] I would add: and too important to be left to the normal political process.

[25]Solow, p. 9.

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Energy Revenue Sharing[1]

B.W. Wilkinson

The issue of how the revenues from petroleum and natural gas production should be shared among Canadians has been a contentious one for some years. The National Energy Program (NEP) has been the main vehicle by which the federal government has sought to increase its share of these revenues and of the economic rents — the returns above what is necessary to keep the industry in operation. The government has also used the federal-provincial equalization structure for this purpose. Regardless of the method or combination of methods selected, it is important that the focus be not solely on dividing the pie, but also on ensuring that the pie continues to grow. In this paper, I shall briefly examine each of these approaches from this perspective and then consider changes that might be beneficial.

Approaches to Revenue Sharing

The National Energy Program

The NEP, as originally introduced in 1980, contained two main elements involving revenue sharing First, a variety of new taxes on the petroleum industry — the Natural Gas and Gas Liquids Tax (NGGLT), the Incremental Oil Revenue Tax (IORT), and the Petroleum and Gas Revenue Tax (PGRT) — were designed to extract a greater share of the economic rents for Ottawa.[2] Second, the NEP allowed oil companies to receive the

[1]I am indebted to Brian Scarfe for helpful discussion on this paper in its early stages, and to Ted Carmichael for very useful comments on an earlier version.

[2]Other new taxes were introduced as well, but these had different objectives. The foreign ownership levy, for example, was aimed at helping to finance the takeover of foreign-owned oil companies

New Oil Reference Price (NORP), or world price, *only* on oil discovered after 1 January 1980, and introduced the Petroleum Incentives Program (PIP), which provided much greater government incentives for companies to explore on the Canada Lands — those areas, such as the offshore and Arctic regions, that are outside the Western Sedimentary Basin. The combination of these last two provisions had the effect of redistributing resource revenues from producers to consumers using "old" oil — that found before 1 January 1980 — on the one hand, and redistributing resource revenues regionally on the other.[3]

Ottawa has pulled back on most of these provisions since 1980. The IORT was first suspended for a year, effective 1 June 1982. Then, in the April 1983 budget, it was deferred until 1 June 1984, and in the February 1984 budget, its reinstatement was delayed for yet another year. When the federal government introduced its *NEP Update* in 1982, it removed the PGRT for small producers up to a maximum credit of $250,000 per year. Subsequently, it permitted the British Petroleum Wolf Lake project, involving thermal techniques to mine 7,000 bpd of oil sands crude, to pay the PGRT calculated on a net (after operating *and* capital costs) rather than on a gross revenue basis. The government then reduced the NGGLT to zero as of 1 February 1984, a level at which it will remain through 1986 in order to permit agreed price increases for gas while keeping the gas price down to 65 percent of the Btu-equivalent price of oil.[4] And, as of June 1983, the government extended the NORP to include all oil found after 1 March 1974 and all infill drilling within pre-NORP fields completed on or after 1 July 1983.

Ottawa's backing away from the original NEP is not difficult to understand, for the industry netback figures tell the story (see Table 1). The 1980 NEP reduced netbacks (before deduction of profit taxes) on old oil discovered prior to 31 March 1974 by 35 percent. Not until the last half of 1983 did netbacks exceed those existing in 1978. The situation is even more noteworthy with respect to natural gas. Netbacks on old gas will never be much better than they were in 1977 until the end of 1986. Those on new gas are expected to be only slightly above the 1977 levels,

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[3]One might also put the Petroleum Compensation Charge (PCC) in this second category of redistribution policies, since it involved a tax on refiners (and, thus, on consumers) to subsidize the consumption of imported and new domestic oil.

[4]With world oil prices having flattened out and promising to remain so, there may be a problem in retaining the 65 percent level if gas prices are permitted to continue rising at $0.25 per mcf every six months, as scheduled.

TABLE 1

Netback Calculations for Conventional Crude Oil and Natural Gas, Alberta, 1975-86

	Crude oil ($ per barrel)			Natural gas ($ per mcf)	
	Old-Old	New-Old	NORP	Old	New
Large Crown Producers					
1975	5.23	6.52		0.41	0.46
1976	5.09	6.57		0.59	0.72
1977	5.33	7.07		0.71	0.88
1978	6.07	8.08		0.80	1.01
1979	6.13	8.04		0.90	1.15
1980	6.49	8.53		1.05	1.36
1981	4.20	7.20	6.80	0.61	0.90
1982	5.88	9.35	13.49	0.70	0.92
1983	7.22	11.18	11.39	0.75	0.93
1984	6.33	10.82	9.82	0.71	0.89
1985	5.75	10.36	9.39	0.71	0.90
1986	5.00	10.93	9.45	0.74	0.94
Small Crown Producers					
1983	9.79	14.14	14.61	1.01	1.20
1984	8.80	14.00	12.77	0.98	1.16
1985	8.02	13.43	12.25	0.98	1.17
1986	7.08	14.01	12.36	1.02	1.22

Note: These figures were obtained from officials at the federal Department of Energy, Mines and Resources. These netbacks are calculated on an "effective tax" basis, and imply certain reinvestment assumptions that may not materialize and, indeed, that could be wildly wrong if interest rates are high and volatile. Netbacks on a full-tax basis — where the corporate profits taxation rates applied are considerably higher — are much lower than these numbers throughout.

Source: B.L. Scarfe, "The New Oil Price Scenario and the Chrétien-Zaozirny Agreement: A Comment" (University of Alberta, November 1983, Mimeographed). [This information is also contained in an article by B.L. Scarfe, in *Canadian Public Policy* 10 (September 1984): 343. — Eds.].

and never during the life of the present (2 July 1983) agreement will they attain their 1978 levels.[5]

Simultaneously, the generous PIP grants redirected exploration activity from Western Canada to the Canada Lands. These grants involve

[5]The situation is more favorable for netbacks on new oil and for small producers of both oil and gas from the Canada Lands. This stems from the reduction of Alberta royalties on such oil by 12-14 percentage points and on gas by about 8 percentage points, and from the relaxation of the PGRT for small producers.

reimbursement for as much as 80 percent of costs for firms at least 75 percent Canadian-owned exploring on the Canada Lands, compared to reimbursement of a maximum of 35 percent for work on provincial lands.[6] In 1982, payments for work on the Canada Lands rose 111 percent over their 1981 level and for the first six months of 1983 were up another 42 percent over the same period in 1982. In contrast, such payments on provincial lands for the first six months of 1983 actually declined 5 percent from those of the comparable period in 1982.[7]

The effects of the NEP taxes and PIP grants, combined with the weakening in world oil markets, have been quite dramatic for the Western Canadian oil industry. In Alberta, exploration work diminished by 50 percent and developed drilling by nearly 25 percent from 1980 to 1982.[8] Total exploration activity on provincial lands declined by over 7 percent in the first half of 1983 compared to the same period in 1982, whereas on the Canada Lands it increased by 38 percent.[9]

More generally, the federal grab for energy revenues, plus the Alberta government's attempt to thwart that grab, created a climate of doubt and uncertainty. When added to the unpredictability of world oil and gas markets, this climate prevented several enormous oil sands projects from going forward in Alberta, with consequent adverse income and employment effects on Alberta and, indeed, on Central Canada too.[10]

In brief, the federal government chose to reallocate energy revenues to itself and, in the process, to wrest control and concentration of the oil

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[6]The five-year royalty holiday now available in Saskatchewan undoubtedly redresses the imbalance for that province. In the original NEP, there were also earned depletion-allowance advantages for expenditures on the Canada Lands. The September 1981 Agreement between Alberta and Ottawa, however, provided for these depletion allowances to be gradually eliminated by 1985, the schedule being depletion of 20 percent on the Canada Lands and 10 percent on provincial lands in 1983, 10 percent and zero respectively in 1984, and zero everywhere in subsequent years (see *Memorandum of Agreement between The Government of Canada and The Government of Alberta relating to Energy Pricing and Taxation*, 1 September 1981, p. 11; Department of Energy, Mines and Resources, *The National Energy Program* [Ottawa: Supply and Services Canada, October 1980], p. 40).

[7]Petroleum Monitoring Agency, *Canadian Petroleum Industry Monitoring Survey*, various issues.

[8]B.L. Scarfe, "The New Oil Price Scenario and the Chrétien-Zaozirny Agreement: A Comment," *Canadian Public Policy* 10 (September 1984): 340-346.

[9]Petroleum Monitoring Agency.

[10]For valuable insights on these points, see J.E. Feick, "Prospects for the Development of Mineable Oil Sands," *Canadian Public Policy* 9 (September 1983): 297-303.

and gas industry away from Western Canada while simultaneously providing some regional development grants for the Atlantic provinces and the North (highly inefficient ones at that). The main method the government used to implement this strategy has had the very unfortunate characteristic of greatly diminishing the level of the industry's operation, to the detriment of all Canada. In fact, it can probably be said that never in the history of this country has a leading sector of the economy been subjected to so many shocks over so short a period of time. These shocks were largely imposed by a government in Ottawa remote from the situation it was attempting to control. One might have hoped that the negative effects upon the metal mining industry in the mid-1970s of federal and provincial attempts to capture the benefits of temporarily higher metal prices would not have been so quickly forgotten by government bureaucrats.

The Equalization System[11]

Economic theory suggests that there will be an incentive for migration to a province that uses resource rents to provide greater public services per capita than other provinces, if these net fiscal balances are not simply capitalized in, for example, land and housing values. This migration would be inefficient if it occurs because net fiscal benefits are greater in the resource-producing province rather than because the marginal product of labor is higher (it could, in fact, be lower). The result would be less, not more, national output. Thus, there may be grounds for a type of resource equalization payment that reduces "inefficient" migration to resource-rich provinces as well as that provides something approaching comparable levels of service to the public in all provinces.

The Canadian Constitution now formally requires that the federal government make equalization payments to enable the provinces "to provide reasonably comparable levels of public services at reasonably

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[11]A vast literature exists on this system. For more detail see, for example, Economic Council of Canada, *Financing Confederation Today and Tomorrow* (Ottawa: Supply and Services Canada, 1982); a series of articles entitled "Financing Confederation," in *Canadian Public Policy* 8 (Summer 1982): 283–310; replies and rejoinders to these articles in *Canadian Public Policy* 8 (Autumn 1982): 621–632; R. Boadway, F. Flatters, and A. Leblanc, "Revenue Sharing and the Equalization of Natural Resource Revenues," *Canadian Public Policy* 9 (June 1983): 174–180; and T.J. Courchene, "Canada's New Equalization Program: Description and Evaluation," *Canadian Public Policy* 9 (December 1983): 458–475.

comparable levels of taxation."[12] In the current equalization arrangement, scheduled to run for five years from April 1982, the revenues per person that would be obtained by applying national average tax rates to the five provinces of British Columbia, Saskatchewan, Manitoba, Ontario, and Quebec establish an average to be used by Ottawa in making equalization payments. This arrangement is referred to as a "representative five-province standard." One hundred percent of provincial resource revenues (except interest earnings received by such entities as the Alberta Heritage Savings Trust Fund) are included, as are local property taxes and local receipts from sale of commodities or services. But actual equalization payments with respect to resource revenues, particularly energy revenues, are not nearly what they might have been because Alberta, which produces the major share of resource rents, is excluded from the five-province standard! This is fascinating, since one of the major motives for introducing the NEP was, apparently, to allow the federal government to extract revenues from Alberta in order to finance the equalization payments made necessary because of Alberta's high resource income. Yet now, although the federal government still gets additional resource revenues, it does not have to make equalization payments based upon Alberta's high (but diminished) resource receipts.[13]

Current measures of revenues received within provinces also exclude the economic rents implicitly going to consumers as a consequence of their being able to buy energy at below either the world price, as in the case of gas, or the long-term marginal-cost price, as in the case of hydroelectricity. Such amounts, although difficult to calculate and open to some disagreement as to their magnitude, are large.[14] The Economic Council of Canada estimated that, in 1980, the implicit rents for oil,

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[12]*Canada Act, 1981*, s. 36 (2).

[13]See K.H. Norrie, M.B. Percy, and L.S. Wilson, "Financing Confederation: Principles and Practices of Equalization," *Canadian Public Policy* 8 (Summer 1982): 290–293.

[14]For example, the Economic Council of Canada estimated that total hydro rents for Newfoundland, Quebec, Ontario, Manitoba, and British Columbia in 1980 amounted to $3.6 billion (Economic Council of Canada, p. 148). J.T. Bernard, G.E. Bridges, and A.D. Scott ("An Evaluation of Potential Canadian Hydro Electric Rents," Resources Paper no. 78 [Vancouver: University of British Columbia, Department of Economics, Programme in Natural Resource Economics, February 1982]) placed these rents at only $2.3 billion.

natural gas, and hydroelectricity combined were $21.7 billion.[15] If such rents are not included in equalization calculations, it is to a province's advantage not to charge its residents at market-price or long-term, marginal-cost levels. Quebec, for example, is in this category.[16] Thus, although an institutional mechanism other than the NEP exists to redistribute resource revenues, its design does not allow it to do this particularly well. There is room for improvement.

Options for the Future

Creating a More Stable and Less Distorting Taxation Environment

The most important principle to be followed with respect to the sharing of resource revenues, now that some of the more burdensome taxes on industry have been reduced or removed, is that a stable environment be created, with longer-term assurances given to industry regarding what will or will not be done. Only in this way is there any hope of maximizing and sustaining the revenues to be distributed so that each group involved can enhance its longer-term returns. Consider the application of this principle in three areas: NEP taxes, PIP grants, and oil sands development.

NEP Taxes

The above tenet suggests that both the suspended IORT and the NGGLT that disappeared in February 1984 be cancelled permanently. This would allow the oil and gas industry to operate without having to expect the reimposition of these taxes should their economic situation improve. It has been shown that, in comparison with the corporate income tax rate for which it is a substitute, the IORT tends to increase taxes for firms undertaking exploration relative to those that are not, ahd to lower the "incentives to undertake low productivity development activity of already-discovered pools."[17] As for the NGGLT, given the expected

[15]Broken down, the implicit rents were $12.0 billion for oil, $6.0 billion for gas, and $3.7 billion for hydroelectricity (Economic Council of Canada, p. 42).

[16]See J.T. Bernard, "Le financement de la Confédération: La rente des ressources naturelles," *Canadian Public Policy* 8 (Summer 1982): 297-299.

[17]See R. Hyndman, "The Incremental Oil Revenue Tax" (University of Alberta, Department of Economics, November 1981, Mimeographed).

modest growth in real oil prices, the abundance of gas reserves, the uncertain effects of deregulation of the U.S. gas market, and the domestic desire to keep gas prices significantly below the Btu-equivalent price of oil, little if anything can be gained by leaving it on the books as a tax to be reimposed at some future date.

PIP Grants

The PIP program, with its wasteful and distorting effects on exploration activity, needs to be altered significantly. To reduce the size of the incentives now may seem to violate the principle of providing a stable environment for oil and gas exploration and development. Given the increasing public awareness of the adverse aspects of this program, however, the uncertainty faced by petroleum companies may well increase if nothing is done. If revisions to the program are clearly specified, with adequate lead time given for industry to make any necessary adjustments, a much greater sense of stability can surely be achieved for all actors involved. Among the revisions that ought to be considered would be:

- to question more closely the costing methods and records used by the oil companies in reporting to the government (this already seems to be well under way);
- to put a ceiling on reimbursements for individual wells;
- to make an announcement that a sizable reduction in the percentage of outlays covered will be commenced in 1985, thus giving the oil companies time to wind down their expensive operations;
- to ensure that when the program expires at the end of 1986, any subsequent incentives offered will not be significantly different from those provided in the Western Sedimentary Basin.

In addition to these revisions, the current policy of allowing preferences for Canadian companies could be continued, which would be consistent with the objective of lowering the extent of foreign ownership and control and, in the long term, redistributing industry revenue shares from foreign- to Canadian-owned companies.[18]

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[18]Although not discussed here, the NEP did, in fact, specify the reduction of foreign ownership and revenues as one of its objectives. The modest gains made in this regard, however, have been achieved only at great expense. Giving exploration preferences to Canadian-owned companies would seem to be a more efficient way of pursuing this objective.

Oil Sands Development

An effective way of both expanding the economic pie and sharing revenues would be for the federal and provincial governments to participate, along with companies having the necessary technology, in new oil sands ventures.[19] In this way, the governments involved would obtain intimate knowledge of how the accounting was being done. At the same time, revenue sharing would not be a major difficulty; it would be based on the return from government participation plus the corporate income tax. The provinces would get royalties as usual, while the PGRT could be levied on a net basis as is the case with the Wolf Lake project.

Other types of arrangements, known as "competitive production contracts", also might be used for some plants.[20] These would entail the federal government (or the federal and one or more provincial governments working together) calling for bids by private-sector firms, first, to construct, and then, to operate, an oil sands plant at a particular location. The government would accept the bid that maximized the economic returns from the project, discounted at an appropriate social discount rate. Among other things, private firms entering into such contracts would face reduced political risks from changing oil prices and/or alterations in production and similar taxes imposed by the governments involved.

Better measures to control construction costs for these plants are also required if the oil they produce is to be competitive with conventional oil. Material and equipment costs can be better managed in the current environment than was possible in the high-inflation period of 1979-81. Labor costs are currently being held down by high levels of unemployment in Western Canada. (Both the 18,900 bpd Esso Cold Lake plant, anticipated to be in production by 1986, and the Wolf Lake plant have kept labor costs down by employing nonunion construction workers.) Oil sands production can certainly be quite profitable, as Professor Adelman has pointed out.[21] If the alternatives are to continue to import large quantities of oil in the future and to pay unemployment insurance benefits to the large number of construction workers and equipment- and

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[19]Increasing domestic production in this way would also keep foreign ownership from expanding. By sharing in new investments at the outset, rather than attempting to buy out existing firms later on, as was tried in 1981-82, the federal government could achieve this policy goal with much less disruption and probably with less expense as well.

[20]See R.G. Wirick, "The World Petroleum Market and Canadian Policy," *Canadian Public Policy* 8 (Autumn 1982): 534-553.

[21][See M.A. Adelman, "The International Context," in this volume. — Eds.].

material-handling operators currently out of work, then additional oil sands plants become even more attractive.

Making Greater Use of the Fiscal Equalization System

While the existing equalization agreement will not expire until the spring of 1987, the current energy-pricing and taxation arrangements will do so at the end of 1984. Consequently, it is not possible to shift quickly to the use of the equalization system as the chief means of energy revenue sharing. Still, that objective might well be borne in mind as the current energy agreement draws to a close. A number of possibilities are worth consideration.

First, a *net* equalization scheme for resource rents could be developed. This would involve using a national average rather than a merely representative five-province standard as is now the case. Under such a scheme, not only would each province receiving below-average per capita resource revenues be entitled to payments, but also each province receiving above-average revenues would pay into the "bank". Calculations would have to be made on only those net fiscal benefits that are not fully capitalized in average land and housing values. A province's resource receipts would also have to include the value of energy sold to its own residents below market price or long-term marginal cost.[22] Concurrently, provinces with above-average revenues would receive credit toward any payments they made into the "bank" for sales of energy to other provinces at below market price or long-term marginal cost.

Second, it should not just be rents from oil and gas production and sales that are counted. Implicit and explicit hydroelectricity rents would need to be introduced as well, even though it would mean that provinces such as Quebec and Manitoba consequently would not receive equalization payments as large as they would if these implicit rents were ignored.[23]

Third, to provide a continuing incentive to provinces to develop their resources and not to waste resources in stimulating development, it would be necessary to leave a substantial portion of rents obtained by a

[22]J. Helliwell and A. Scott (*Canada in Fiscal Conflict: Resources and the West* [Vancouver: Pemberton Securities, 1981], p. 55) point out that there are various types of rent-like surpluses created in the provinces in addition to those from resources. They suggest, therefore, that the present federal-provincial form of equalization arrangement be replaced with an "inter-provincial sharing system".

[23]Economic Council of Canada, Ch. 4.

province from its resources out of the equalization calculations. The size of this portion would have to be negotiated. A commonly suggested figure is 75 percent, but I would suggest that this is much too high.[24] Fifty percent, as occurred in the 1977-82 equalization agreement — although that agreement only provided for the federal government to make up deficiencies of the "have-not" provinces, rather than obliging the "have" provinces to contribute to the pot as is being suggested here — and possibly even less, would seem to be a more appropriate figure.

The "have" provinces, such as Alberta, may object to such an arrangement. Yet, if the federal government commits itself not to increase taxes on the oil industry in the future should prices rise rapidly once again, and if hydroelectricity rents are included in the equation, this approach might become more acceptable. Moreover, if a commitment were made to include any future resource rents from other sectors of the economy as these might arise, the acceptability of such an arrangement might again increase. Alberta could also stand to gain in the future should it become a recipient from the pot.[25]

In conclusion, no system of revenue sharing can be perfectly equitable or perfectly consistent. Compromises will be necessary no matter what system is agreed upon. Our prime concern for the future should be to use our human, natural, and capital resources much more fully so as to enlarge the revenues to be shared, rather than spending our time tearing apart our society and wasting our resources because of differences about who has control and who gets what. The spirit of low-key cooperation that characterized the June 1983 Agreement between Ottawa and Alberta is a good start in this direction. May it continue.

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[24]See, for example, Helliwell and Scott; Boadway, Flatters, and LeBlanc.

[25]Helliwell and Scott.

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Managing Canadian Energy Demand and Supply

R.G. Wirick

Introduction

Approaching the topic of "Managing Canadian Energy Demand and Supply" can be rather intimidating. The issues are numerous and complex; the related policies — both those in effect and proposed alternatives — have substantial far-reaching effects; and the analysis and commentary to date would fill many volumes. This paper is intended neither to synthesize nor to evaluate what has been stated previously. Indeed, I believe something can be gained by standing back a bit from the welter of legislative interventions, empirical projections, criticisms, and counter-criticisms, and simply asking what should be the purpose and nature of government involvement in Canadian energy markets. With this idea in mind, this paper offers two significant principles — opportunity-cost pricing and rent taxation — upon which, I believe, such government actions should be based. The overall thrust and implications of these principles can be summarized in the following assertions (which subsequent sections will support and amplify):

- Canadian governments — federal and provincial — have been, are now, and always will be deeply involved in domestic energy markets; a complete "hands-off" policy is neither feasible nor desirable. Specific government interventions should be guided by the two objectives of promoting the efficient development and conservation of energy resources, and assuring that an appropriate portion of the resulting market returns accrue to the general public.
- Energy prices should be set to achieve efficient resource use rather than to redistribute economic returns. The price of an energy fuel, there-

fore, should be equal to the full alternative or opportunity cost of its use.
- Under current economic conditions, this implies, for example, that *all* Canadian crude oil prices should be *at least as high* as the current landed, import cost of equivalent international petroleum supplies.
- Government resource revenues should be raised through levies on the economic rent — that is, the surplus of market price over economic cost — generated from energy production and sale. Goals other than economic efficiency should be met, wherever feasible, by redistributing these rents in a way that does not itself distort energy supply/demand decisions.
- Even under a well-designed system of energy taxes, firms face the uncertainty that future political changes could alter the long-term profitability of major contemplated energy investments. Governments must take steps to minimize the extent and/or impact of this political risk on such supply decisions.

Rationale for Government Involvement

A useful departure point for these reflections is to ask why there should be any government role in the management of energy supply and demand. We seldom have learned discussions or public policy debates about the management of demand and supply conditions in the iron and steel, newsprint, aluminum, or numerous other industries. What makes the energy sector, if not "unique", then at least "special"? The answer, in my opinion, has to be the simple and obvious fact of ownership. Almost all Canadian oil and gas reserves are located on Crown lands, as are most nuclear and hydroelectric resources. The general public, therefore, has a vested, legal right and, indeed, an obligation to set the *terms of access* to these resources. In essence, the government is the landlord and, as a result, some type of government involvement in supply decisions is both inevitable and entirely justifiable. As landlord, the government must keep in mind both the objective of efficient use of energy resources and the desire to capture, on behalf of the public, a high level of resource revenue.

These two goals can conflict since, in general, the tax and pricing structure that maximizes total revenue collected will create a time path and structure of production that is far from optimally efficient. This must be avoided; the proper task of government is not to exploit its monopoly control over access and, hence, rob Peter in order to pay Paul. Instead, the key objective should be to gather revenue without distorting

supply and demand patterns. Market prices, therefore, should be allowed to fulfill their essential purpose of signaling efficient decisions about energy production and conservation, while taxes and royalties should be levied to collect a "fair share" of the resulting economic rents. Specifically, the prices paid for Canadian energy resources should reflect the true opportunity cost of their use, either the cost of alternative sources of supply or the returns available on sales to other markets. From either perspective, the principal determinant of the efficient Canadian price for energy is the world petroleum price, since not only is this the cost of residual oil supplies but it also heavily influences the price of Canada's natural gas, electricity, and coal exports. The economic rent base for any tax or royalty payment, therefore, is simply the difference between this internationally determined price and actual economic supply costs. Since economic costs incorporate an allowance for a normal return on investment, including an allowance for risk, taxation of revenues in excess of this amount will not alter supply decisions.

Although, in practice, many complications arise in trying to implement these concepts, the two basic principles remain strong and useful yardsticks for policy appraisal.

Implications of the Opportunity-Cost Principle

Adoption of the opportunity-cost principle raises two questions. First, what are the practical conclusions for current energy-pricing policies? Second, are there any circumstances under which the domestic opportunity cost for energy will differ markedly from the world oil price?

Assuming initially that the international petroleum price is the appropriate gauge of value, the pricing implications are several. For crude oil, the current array of differential prices — the conventional old oil price, the new oil reference price, and others — would be abandoned in favor of the single world-price standard, with allowance for quality and transportation-cost differentials. The Btu-based coupling of natural gas and oil prices would be eliminated, as would federal restrictions on gas export prices. Domestic gas prices would then be allowed to float to the opportunity-cost level of the U.S. market price. This, in turn, would be linked closely to world oil prices in the long term but, as Professors Adelman and Waverman argue in their papers,[1] current U.S. regulatory

[1][See M.A. Adelman, "The International Context"; and Leonard Waverman, "Canadian Energy Policy after 1985: Lessons from the Present," in this volume — Eds.].

barriers prevent normal price arbitrage. Nonetheless, the market export price remains Canada's opportunity cost for natural gas, and removal of the parity-pricing restriction should lessen possible political opposition to lower export prices since domestic prices would fall in unison.

In principle, export prices also can be used as opportunity-cost proxies for electricity, at least in those provinces with significant net sales to the United States. An alternative (lower-bound) estimate is the marginal economic replacement cost of generating capacity. The fact that electricity production is the responsibility of provincial crown corporations, however, creates some practical impediments to opportunity-cost pricing. In most instances, for example, legislative terms of reference restrict profitability and, hence, set implicit price ceilings. Furthermore, the current federal-provincial equalization system provides an incentive for provinces to capture electricity rents in the form of lower prices rather than increased provincial revenue. As a result of these and other factors, the magnitude of foregone resource rents is exceedingly large.[2]

In addition to its direct implications for particular fuel prices, the opportunity-cost principle has another important corollary. *Once resource prices reflect their actual alternative-use value, governments should avoid further active attempts to manipulate supply/demand decisions.* This assumes that, for all their imperfections, private market forces will assure greater production and consumption efficiency than would the bureaucratic/political process. There will be exceptions: continued government provision of consumer information on the energy efficiency of appliances, automobiles, and home heating and insulation systems is a worthy endeavor; and the government should retain its mandate to sanction noncompetitive business practices, as it does in other industries. But the maze of special subsidies and taxes used to direct particular supply and demand decisions should be abandoned. In short, the government should give the proper price signals and let the market choose the appropriate energy development and conservation investments.

This leaves the question of whether the international oil price truly represents the correct opportunity cost of Canadian energy supply. Let us consider three possible reasons for a discrepancy between domestic and international oil prices. The first is the exhaustible resource argument. Since foregone resource production entails *postponed* rather than

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[2]See, for example, the calculations in Economic Council of Canada, *Financing Confederation Today and Tomorrow* (Ottawa: Supply and Services Canada, 1982).

lost revenue, the opportunity cost of development must include a measure of the maximum (discounted) future market value. This estimate, in turn, depends on the anticipated time path of world oil prices, the magnitude of the discount rate, and the size of Canadian energy reserves — which affects the length of the time horizon. Professor Adelman indicates that the consensus forecast is for real oil prices to grow at a long-term annual rate of 2-4 percent, which is significantly less than an appropriate discount rate. I believe the most likely trend is for flat or even somewhat lower real prices. In either case, the discounted value declines as the horizon extends into the future. Hence, with large nonconventional energy reserves, Canada's alternative future-use value for energy resources is likely to be far less than current world market prices. In any case, even if this analysis is wrong the exhaustible resource argument will imply only that domestic prices should be *higher* than current oil import costs.

A second rationale for raising domestic oil prices above foreign levels is that application of a suitable oil import tariff would allow importing nations such as Canada to shift the terms of trade back in their favor, thus improving their overall level of economic welfare. In essence, the sword of market manipulation can cut both ways. By placing a duty on oil imports, the consuming nations would encourage conservation and domestic energy production, which would, in turn, lead to a decline in international petroleum demand and, hence, downward pressure on world oil prices. How much prices actually fall will depend on the magnitude of the demand contraction and the response of the oil-exporters. My assessment is that the 1983 price cuts and the imposition of individual country production quotas mark a new and much more vulnerable era for the exporters' oligopoly. The omnipresent, though seldom-voiced, Saudi threat to react to any breakdown in cartel discipline by flooding world markets with greatly expanded output acts as a strong stabilizing influence. Yet, the urge to cheat — by producing in excess of quota — remains a very strong one, especially for those countries facing especially acute economic and social pressures.

The possibilities for a breakdown in cooperation and a significant drop in oil prices would be greatly enhanced if the consuming nations used oil import duties to further reduce international demand. If successful, the domestic price effect of such a duty would be relatively modest, as the fall in world prices would largely offset the tariff itself. In essence, the duty would represent a method of taxing the Organization of Petroleum Exporting Countries. From Canada's viewpoint, the usefulness of

an oil import duty would depend on coordination with other consuming nations. Because of Canada's relatively small presence in world markets, the unilateral imposition of a Canadian tariff would have little or no impact on international prices. There is a strong incentive, however, for Canada to participate in a multilateral, or failing that a joint Canada-U.S., tariff action.

The third reason for separating domestic and foreign oil prices reflects the nature and impact of the market risk resulting from world oil market volatility. One must be careful here, however, for as Len Waverman has stated, neither the mere existence nor the importance of international price uncertainty is, by itself, an adequate argument for government interference in domestic pricing — and, therefore, supply/demand — decisions. For example, "security of supply" is a poor justification for intervention. The claim is that Canada should pay a premium — above world oil prices — to develop petroleum self-sufficiency as a protection against uncertain foreign supplies. The fallacy of this assertion is that even a massive interruption of oil supplies, such as would result from a closing of the Strait of Hormuz, would not lead to widespread physical shortages of oil, though it would markedly raise the cost of access. Short of nuclear holocaust, Canada will be able to buy oil if it is willing to pay the price.

A somewhat stronger, though still questionable, argument is an application of the old cobweb model of supply behavior so beloved in introductory economics textbooks. The recent decline in world oil prices, it is asserted, could lead to an overreaction by consumers and producers that would leave the economy even more vulnerable to a price shock in the future. The implication is that governments should use tax and subsidy initiatives to assure a continued high commitment to energy development and conservation activities. Although I have some sympathy with this view, the argument does depend to some degree on governments being able to foresee future price developments better than private firms and households. The Canadian experience of the last several years would tend to reinforce any innate skepticism about such an assumption.

The most defensible position focuses on the stagflation effects of any sharp increase in oil prices. The economic disruption caused by a simultaneous rise in inflation and unemployment can be viewed as a negative externality — that is, a cost to society as a whole that is not adequately accounted for or compensated by private market actions. The corollary is that there is a potential social benefit from assuring that domestic prices are more stable than oil import costs.

Stability by itself implies nothing about the average domestic price level. In practice, however, the internal crude oil price would have to be high enough to make Canada self-sufficient in petroleum. Otherwise, the long-term viability of a "fully-insulated", two-price system becomes very questionable if for no other reason than it represents a potential blank check on government revenues. Furthermore, to achieve long-term oil self-sufficiency, it is almost certainly necessary to set the domestic price high enough to make substantial nonconventional petroleum supplies viable. This probably means a price at, or somewhat above, current world levels. One way to achieve this would be to establish a fully indexed target domestic oil price of, say, Can.$40 per barrel. Should world prices fall below this level, an import duty would be levied equal to the difference in costs; should the international price rise above $40, an oil export tax, again equal to the differential, would be imposed.

It is clear that such a scheme is feasible. Whether it is desirable is much less certain. Any long-term discrepancy between domestic and world oil prices entails potential economic distortions, and the benefits of insulation would have to outweigh these costs. International price shocks would still affect our major trading partners, and the resulting export/import, exchange-rate, and financial repercussions would create serious problems for the Canadian economy. The case for intervention, therefore, again could become much stronger if it was undertaken as part of a coordinated, multilateral action.

Economic Rent and Political Risk

Whether Canadian energy prices are geared directly to world oil prices or — for terms-of-trade or risk-minimization reasons — a tariff wedge is driven between the two, governments must still overcome the problem of extracting economic rent from producers without disrupting supply decisions. There is little doubt that the existence of huge rents in Canadian energy industries since the surge in world oil prices in 1973–74 and 1979–80 has been the source for most of the ensuing political conflict and public policy initiatives. The struggles that pitted the federal government against the provinces, consumers against producers, and region against region introduced a number of supply/demand distortions. These distortions were meant not as measures to manage the energy markets but as means either directly to capture economic revenues or indirectly to pressure competing interest groups into accepting a different revenue-sharing

split. Preoccupation with splitting the rent pie also distracted attention from the fact that the prospect for far less buoyant world oil prices meant that the pie itself was not as large as had been assumed. In short, the emergency of large *economic rents* was followed by an overestimate of and quarreling over *total economic revenues*, and by seriously wasteful supply and demand interventions.

Part of the problem is political, although I detect a much more realistic and cooperative attitude among all groups now than existed even two or three years ago. But the difficulties also partly reflect a poor ordering of economic priorities. Implementation of the principles of opportunity-cost pricing and rent taxation would be of help since, in theory, they would limit disputes to a struggle over *rents* rather than *revenues*. Acceptance of world oil pricing, for example, entails a real loss to energy-consuming Canadian firms and households. Who gains from such a move depends on how the resulting rents are distributed. The proposal I favor is to capture the rents through taxation and then to return most, if not all, of them through a combination of refundable tax credits to households and a rebate on corporate income taxes. This would avoid any supply/demand distortions while minimizing major adverse redistributional effects.

Regardless of how conscientiously the principles are applied, problems of practical implementation will remain. The chief difficulty is that the taxation of rent requires a measurement of total economic cost, including both total production costs and a risk-adjusted return on investment. It is impractical to believe that both of these factors can be accurately estimated for all the thousands of potential energy investment decisions. It is reasonable to expect, therefore, that investments will be grouped into cost categories for taxation purposes. Indeed, the differential taxes applied to conventional and nonconventional oil production are a good example of such an approach. The system would be improved, however, by making the cost estimate explicit for each category and applying the tax only to the corresponding rent. Shifts in market prices would then cause accentuated changes in economic rent but would not distort basic supply incentives.

The final and most important facet of the problem is that there is a lag between the time an investment decision is made and the moment when revenue is earned and taxes paid. This means that while the investing firm knows the *ex ante* taxation rules, it faces the very real political risk that the government may introduce capricious *ex post facto* tax changes in the future.

Nonconventional petroleum projects are particularly vulnerable to arbitrary regulatory changes because of their enormous fixed-cost component and long lead times. Once the initial capital investment is in place, production is fully committed for a period of several decades. Knowing their potential vulnerability to unfavorable tax shifts, firms may incorporate a significant political risk premium in their assessment of such capital investments.

The problem is acute because governments cannot contractually bind themselves to any current agreement or policy. At any time legislation can be passed that creates unilateral, *ex post facto* changes in previous taxing, royalty, or lease arrangements. This is far more than just a theoretical possibility, as has been amply demonstrated by both the 25 percent "back-in" provision of the National Energy Program and the arbitrary changes in the original Syncrude pricing guarantees. This very real risk has created a very real impact. The failure of the Alsands project, for example, while clearly influenced by the downturn in world oil price prospects, was almost certainly affected by perceptions of significant political risk. This was the conclusion I reached in some earlier work on the issue,[3] and it also would appear to have been the conclusion of Petro-Canada's chairman:

> In the Alsands case there was another issue that was not discussed publicly, but...was more important than notions of [market] risk and return.... [T]he project became (so) very dependent upon unusual government agreements that another kind of risk emerged. And this was — could the investors trust the governments involved to honor their commitments during the life of the projects?[4]

The recent "splintering" of Imperial Oil Limited's heavy oil project at Cold Lake may be another example of political risk having a serious impact on an energy supply decision. By all accounts the phasing of the initial project into small, individual components undertaken one at a time has meant a significant loss of economies of scale for Imperial. Such careful incrementalism, however, also leaves the company far less vulnerable to *ex post facto* tax changes.

To overcome the supply distortions of political risk, it is necessary either to minimize the impact of this risk on private returns or to reduce

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[3]R.G. Wirick, "Prospects for the World Petroleum Market and Implications for Canadian Policy," *Canadian Public Policy* 8 (Autumn 1982): 534-553.

[4]W.H. Hopper, as quoted in "Where Was Honor?" *Globe and Mail* (Toronto), 10 November 1982, p. 6.

the risk itself. Elsewhere I have discussed one possible way of pursuing the first of these options through the use of what I called "competitive production contracts".[5] Basically, the idea would be for the government itself to assume the risk of major energy investment projects such as the tar sands by contracting out the capital and operating costs, evaluating the expected market returns in light of these costs, and proceeding with the project only if expected returns were adequate. Private companies still would conduct the actual operation, but they would be paid on a "fee-for-service" basis. The government would sell the oil produced, at a realized profit or loss depending on actual future market conditions. Such an approach has much to commend it, although it obviously represents a major departure from current practices.

The alternative is to continue the private development of tar sands and frontier energy projects but strengthen both the substance and the believability of government commitments to uphold any signed royalty or tax agreement. Credibility, however, must be built on two cornerstones. The first and most obvious is experience: the government must conscientiously avoid the temptation to indulge in unilateral *ex post facto* interventions. Accumulated experience with such reformed behavior, it is hoped, will help convince firms that the government's word is indeed its bond. The government can also increase its credibility by substituting political for legal constraints. *Ex post facto* legislation then would likely be used only when there is significant public support for the measure.

At issue, therefore, are the circumstances under which Canadian voters would approve a future government initiative to grab a greater share of the market returns to a major energy project. A cynic might say that simple taxpayer greed would sanction almost any action that was not blatantly confiscatory. I seriously doubt such a claim. Canadians have a strong sense of fairness that, although loosely and often conflictingly defined, would have to be satisfied before an *ex post facto* tax increase would be acceptable. Specifically, the public appears to have approved of such actions only when it perceived the existence of windfall profits generated by unexpectedly high international energy prices. In essence, energy taxation arrangements have contained an implicit *force majeur* clause that has allowed governments to alter taxation terms whenever there has been a major *unanticipated* change in market circumstances. Viewed in this way, the likelihood of future *ex post* interventions could be reduced by explicitly specifying *ex ante* how taxes would alter under differing market conditions.

[5]Wirick, 546-549.

It would be neither practical nor even desirable to completely eliminate the government's future discretionary power, since the variety of possible tomorrows certainly exceeds any human ability to forecast today. The use of what economists call "state-contingent" contracts, however, would help limit some sources of capriciousness. For example, the most important contingency is the future level of world oil prices. Each energy development agreement should delineate clearly the public/private split of returns under a wide array of alternative price paths. Since project costs are almost invariant with respect to changes in real energy prices, these price changes will lead to accentuated differences in economic rent. The price-contingent schedule, therefore, should show a significantly greater government tax share under high prices than under low prices. The key point is that all world pricing eventualities would be considered and agreed to before any investment actually occurred. And not only would the firm be able to assess its potential returns -- dependent on world market conditions — but it would also have some assurance that the tax and royalty regulations for the project would remain the same even if the market price changed considerably.

Conclusions

The concepts of opportunity-cost pricing and rent taxation are straightforward and quite well known to both academic economists and public policy analysts. Yet this same simplicity and familiarity may have prevented the more widespread use of these concepts by decisionmakers facing the enormous complexities of actual energy policy problems. And, as this essay has indicated, there certainly remain many problems in the detailed application of these ideas. The underlying logic of separating efficiency-enhancing and rent-producing interventions, however, is a very strong one, and it would be the height of foolish sophistication to reject an idea on the basis that anything that is intuitively obvious cannot be useful. Indeed, I have argued here that present Canadian policies have led to severe, wasteful distortions of energy supply/demand decisions. Substantial, real gains would result from implementation of the twin policy principles of opportunity-cost pricing and rent taxation.

6

Financing Energy Developments, 1985 and Beyond

John Grant

We face startlingly different questions about energy development and financing in the late 1980s than we had anticipated a few years ago. Although I foresee little difficulty in obtaining access to capital on reasonably attractive terms for those projects that meet internal and external tests of viability, it is likely that these tests will be applied much more stringently than we have become used to over the last few decades of rising inflation and complacent leverage. Financing energy projects will increasingly depend on the conduct of macroeconomic policy in the United States and Canada. This paper will discuss this crucial linkage and the challenges that await both borrowers and lenders.

I think that the most critical determinant of Canadian financing conditions will be the course of U.S. and Canadian federal fiscal policy. We can expect monetary restraint to continue, finally breaking the back of the inflation cycle with which we have lived for over twenty years. By the late 1980s, I expect that we will have finally restored broadly stable price conditions in North America. This is a hotly debated point, however, and major supply shocks or political wind-shifts could still delay or derail the movement that is now carrying us down toward price stability.

In my opinion, however, the macro policy issue is not whether we will keep economic growth restrained, thus gradually snuffing out the basis for continuing inflation, but rather the choice of policies we should use to achieve that result. In particular, society and governments must decide whether high real interest rates or tighter fiscal measures should dominate in overall restraint. I believe we are now seeing the emergence of a consensus that the burden of restraint should be shifted toward fiscal measures and that, through a combination of further tight restraint on public-sector outlays and, when necessary, increases in tax rates, we

should create fiscal drag sufficient to permit real interest rates to come down. The April 1983 budget introduced by Finance Minister Lalonde was a bellwether effort in this direction, anticipating as it does both a sharply lower growth of government expenditures than GNE for the coming years and a significantly higher tax rate structure from mid-1984 onward.

Though there are, undoubtedly, limits to the effective action we in Canada can take to lower interest rates by ourselves, Canadians do have some room to maneuver, as we have already seen in 1983. Even if the U.S. Administration and Congress stubbornly pursue an easy fiscal policy that keeps U.S. real interest rates very high, we are able to detach our interest rates from theirs, depending on the degree to which the overall borrowing requirements in our economy fall short of the supply of saving from domestic lenders.

Since 1979 Canadian consumers have made extraordinary and persistent efforts to reduce their burden of indebtedness in relation to their disposable incomes. Somewhat belatedly, corporations, too, are now engaging in a similar effort, which has a long way to go. In a comparable but much delayed evolution, Canadian governments are also preparing to put our collective balance sheet in better shape once private balance sheets are well on the way to robust health.

If this is broadly correct, we should observe a possibly very significant drop in real, and even more in nominal, interest rates after 1984, subject to the degree to which the United States moves in the same direction. In turn, this would reduce the cost of servicing private and public debt, and should provide the basis for a release of pent-up demand in the following year.

We now face a basic trend of relatively slow growth in domestic demand in Canada over the next decade and beyond. North America, Western Europe, and even Japan are now relatively mature economies. The focus of the world's expansion has already moved to the newly industrializing countries, and in particular to Southeast Asia, where canny, commercial opportunism is being combined successfully with financial prudence and acumen. It is only reasonable to expect that the focus of our own economy will shift increasingly to exports to countries such as Singapore and Indonesia, and behind them the colossal giants of India and China, both of which are potentially inexhaustible markets for all the goods and services we can produce. I can see Canada becoming even *more* trade-dominated than it has been in the past, and more diversified in its trading relations to boot. The point of this is to indicate that,

whereas Canada is not likely to suffer from a shortage of domestic saving relative to investment to meet *domestic* demand, ultimately there may be pressures on our lending capacity from *foreign* borrowers, or from would-be exporters wishing to expand their capacity to serve Asia and the other fast-growing areas of the world.

In any case, fiscal policy in Canada and the United States will set the basic tone for the economic viability of energy projects whose payoffs are of a long-term nature. If high real interest rates are forced to stay high or to go even higher in order to maintain a disciplined and evenly spread economic recovery, then many energy projects will, predictably, fail the test of viability. On the other hand, if I am correct in my forecast, hurdle rates for long-term investment projects will become somewhat less onerous, while the burden of restraint will fall more heavily on soft goods, on services, and on the size of the public sector.

The specific form that fiscal restraint takes will be critical to the fortunes of energy development in Canada. In the scenario painted by Professor Adelman,[1] highly volatile world oil prices and continuing energy conservation efforts will keep market forces erring on the side of conservatism and risk-avoidance in the energy sector. A strong and sustainable effort to move Canada rapidly toward self-sufficiency in oil will probably require a further reconsideration of tax and royalty structures in the energy industry. Much will also depend on the continuing reassessment of Canada's development potential as exploration continues.

The industry will have to realize that, given the overall trend toward greater fiscal restraint, any decision by federal or provincial regimes to shift the balance of taxation and subsidies in its favor will take place in an exceedingly tight-fisted climate. The advantages of lower real interest rates will be painful to achieve, and I cannot imagine any federal or provincial government giving up a particular tax or royalty without the most careful balancing of advantages and disadvantages from such a move.

Nonetheless, the April 1983 budget has set a very determined course toward a greater degree of fiscal restraint and, significantly, has placed the burden of restraint on consumers rather than on the corporate sector. The budget anticipates a significant increase in the federal sales tax next September; we can also expect major increases in payroll taxes in the next few years, both to finance the Canada Pension Plan account and to reduce the deficit in the Unemployment Insurance account. In addition,

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[1][See M.A. Adelman, "The International Context," in this volume. — Eds.].

we face a significant increase in the average personal income tax rate in January 1985. At the same time, the budget provides important relief measures for business, including, for example, improved tax-loss carry-forward provisions. As far as public-sector spending is concerned, I project that federal expenditures, including transfers and interest on the national debt, will increase at a rate of only about 5.5 percent between 1983 and 1985, whereas the total value of GNP is likely to expand at a rate of about 9 percent. Given the strong showing of the Progressive Conservative party in recent Gallup polls, I think it is unlikely that this relative decline in the size of government spending will be halted or reversed in the period we are discussing.

While high real interest rates persist, they undoubtedly bias the pattern of the economic expansion. Unfortunately, energy projects tend, in many cases, to involve investment in massive physical facilities whose payoffs must be stretched over decades, and these are precisely the kinds of projects most sensitive to high real interest rates. A high real rate is a high rate of discount against future returns. If there has been until recently a comfortable assumption among corporate planners that inflation would remain high and that high interest rates would be temporary, that assumption is now being reexamined. Unless U.S. and Canadian fiscal policies move decisively toward restraint, high real interest rates will remain a fact of life. Under such circumstances, it will be extremely difficult for a large number of energy projects to meet the viability criteria of financial markets. Tar sands projects, electricity-generating projects, and pipelines all typically face extremely tough hurdles in the marketplace. In many cases, such projects will never even get to the point of testing in the marketplace — internal hurdle rates, set in reference to financial market costs of capital, will preclude many of these projects from proceeding.

The energy industry is thus in a difficult position. The demand for its output is rising less rapidly than GNP as a whole; large segments of it are particularly sensitive to high real interest rates; and rapid development may require a significant easing of tax and/or royalty treatment at a time when other politically sensitive sectors of the economy are themselves liable to be resentfully groaning under high burdens of taxation.

All of this means that financial markets will pose greater challenges to the energy industry than we have seen for a long while. This is a decade in which the forgotten rules of what used to be prudent finance have been dusted off and applied once again. Lenders and borrowers alike consider balance-sheet strength to be far more important than before. Companies

will, as a matter of course, tend to rely much less on the potentially cheap, but risky, financing that debt markets can provide, and much more on building up relatively expensive, but safe, equity.

On the other hand, and partly for the same reason, the *availability* of financing is likely to be relatively easy. In my opinion, the overall demand for financing in Canada over the balance of the 1980s will be closer to the capability of domestic lenders than has been typical in the last few decades. I say this because Canada's economic growth prospects are now much lower than they used to be, and because our saving potential is high compared to what it used to be. We have become accustomed to thinking of Canada as a fast-growing country, where each year large amounts of foreign capital have had to be imported to finance rapidly growing investment, a great deal of which was in the energy industry. But the growth of the coming years will be concentrated in the newly industrializing countries. We are likely to find that our own standards and inclinations lead us to put in place less domestic investment, relative to the size of our total economy, than has been typical in recent decades.

One of the major reasons for my view that our capital spending requirements will place relatively little strain on our financing in the late 1980s is that, as I perceive it, the role of government in our economy is now decisively being reduced. By almost any country's standards, we have an excellent urban and social infrastructure already in place. The political debate now raging does not focus on whether, or to what extent, we should expand the role of government in the economy. Rather, it has to do with the degree to which Canadians are prepared to cut back further on these collectively purchased goods and services, just as we have had to cut back on private living standards relative to our earlier aspirations. Admittedly, it has taken a very long time for governments to restrain their spending, and it is taking much longer to work through the complex consequences of their special role in the economy — that is, their responsibility to be a safety net in recessions and chief borrower when other borrowers fall silent. But we have now come to the end of the road for increasing government deficits. In my opinion, we can look forward to a long period in which government deficits will decline, not only relative to the size of the GNP but even, for a while, in absolute terms. As a result, we should see a considerable easing of pressures in Canadian financial markets from now on. And if the President and Congress of the United States finally take decisive action to reduce the U.S. federal deficit as well, then there can be no question that we will observe a very significant decline in North American real interest rates. Such a drop, which would

be the first major decline since 1975, would bring in its train a substantial improvement in common share prices and a major release of pent-up demand for such items as autos and housing, which have been held back for so long by high real interest rates. Unquestionably, those companies whose balance sheets have been carefully strengthened and improved during the recent years of retrenchment will then be likely to indulge in a wave of "pent-up" spending on modernization. Those companies that are still overburdened with debt will themselves be made dramatically better off by the sharp drop in interest rates, but it will take such companies more time to build up the balance-sheet stability required of them to merit serious consideration by lenders.

The late 1980s seem likely to be a period in which many new directions for Canadian entrepreneurial instinct will become concrete and material, embodied in a wave of investment activity. What we must ponder today, however, is the extent to which the energy industry will share in that wave.

We can be fairly certain that electricity generation will not figure very heavily in Canadian capital projects during the late 1980s. On the contrary, we seem likely to have a large surplus of exportable electricity until well into the 1990s. The Major Projects Task Force, in its report released in 1981, contemplated some $100 billion of electricity-generation-project spending over various time periods between the late 1970s and the mid-1990s.[2] Today that figure might be cut in half.

The outlook for petrochemical development, too, is now substantially reduced from the levels forecast by the Major Projects Task Force. Similarly, the outlook for pipeline construction is vastly different today from that which the Task Force anticipated, with the Alaska gas pipeline, the Dempster lateral, and others as well probably out of the story.

The outlook for petroleum and natural gas development today, as compared to the admittedly overdramatic estimates of the Task Force, is even more depressed. Without significant new developments on the taxation front or a major change in the international environment, it may be reasonable to think that only about one-third of the spending that the Task Force contemplated between 1983 and 1990 will now go ahead in this sector.

Projections and estimates made at any time will always be no more than reflections of the assumptions of the day, which, as we have dis-

[2]See Consultative Task Force on Industrial and Regional Benefits from Major Canadian Projects, *Major Canadian Projects, Major Canadian Opportunities* (Ottawa: Department of Industry, Trade and Commerce, June 1981).

covered, are likely to be invalidated by the passage of time. Just as the enthusiasm of 1980 and 1981 now appears to us to have been overly optimistic, we may look back on today's sobriety with regret in a few years' time. But I do not think so. In my view, both the energy industry and government will have to take these considerations to heart in developing a new joint strategy for dealing with Canada's energy development in the coming decade.

It does appear that far fewer energy projects than we had anticipated will meet the tests of the market. Therefore, if we as a nation wish to proceed to greater self-sufficiency in oil and to greater Canadian ownership of the industry, we will, in all probability, have to adopt different tax royalty and subsidy policies than those that have evolved to date. Financial markets will continue to demand a much greater degree of robustness and flexibility in corporate financial structures than has been customary. To the degree that the present structure of taxation and royalties impedes the achievement of corporate financial robustness, it will likely also impede attainment of our national energy development goals. Ultimately, social returns will probably be maximized by helping private companies build up their financial strength so that they are able to pass the more stringent internal and external tests that will be required of them if projects are to be implemented in confidence in this new environment.

To end on an optimistic note, I would say that while we may all be sadder as a result of our experiences, we may also be considerably wiser. In my opinion, this move back to healthier balance sheets and to stable price conditions is a move for the better. Even if we have to accept a more restrained pace of energy development than earlier anticipated, at least we are likely to proceed with a more justified sense of confidence.

7

Energy Issues in a Public Policy Context

Thomas E. Kierans

I would like to broaden our discussion of energy issues by moving from the realm of pure economics into that of public policy and, perhaps, even into politics as well. The energy pricing agreement between the federal and Alberta governments will expire at the end of 1984. Its successor will be hammered out in a context larger than that of the economic one alone, although the terms of reference should, of course, be economic.

As an economic statement, I can find little fault with the overall review of Canadian energy policy that Professor Waverman has presented to this symposium.[1] His paper argues cogently for a return to energy policies that are more responsive to market forces, more flexible, and less interventionist. Economic efficiency is, however, but one of the many considerations that influence the formation of public policy. Recently, the theme of economic efficiency has assumed a preeminent role in public discussion of options for energy policy.

I am frankly astonished by the extent of the emergence of a complacent consensus concerning the energy policy/market economy thesis. Agreement is growing among economists, businessmen, informed journalists, and even the producing provinces in arguing for a market-driven energy policy. I would submit, however, that the thesis must be broadened if national policymakers are to join this consensus. Without them, it is akin to one hand clapping.

Arguments for an energy policy guided by market forces are not new; indeed, they were stated forcefully by many observers even before the second oil price shock. They are much more comprehensive today, which is a fitting response to the conceptual grandeur, the arrogance, and, indeed, the present reality of the National Energy Program (NEP). None

[1][See Leonard Waverman, "Canadian Energy Policy after 1985: Lessons from the Present," in this volume. — Eds.].

of these arguments is, however, sufficient to compel national policy-makers, as opposed to political novitiates, to execute an about-face in determining policy.

Any major change in energy policy must be based on a convincing demonstration to the Canadian public that the prevailing political and economic climate has changed — most probably in radical and permanent ways. Canadians need to be convinced that energy policy must be restructured to respond to this climatic shift. Barring the exertion of continuous and extraordinary acts of leadership and communication, such an achievement seems to me unlikely. Why?

The public consciousness these days is far more attuned to the prevalence of uncertainty than to risk. The public views a return to rapid inflation and abrupt, random, commodity price increases as a distinct possibility, if not a probability. Enduring fiscal deficits, high interest rates, and even international threats such as a closure of the Strait of Hormuz or nuclear annihilation are further examples of the kinds of uncertainties that haunt the public's imagination. These anxieties combine to produce oil price scenarios within the "reasonable band of $68–85 per barrel" (according to the U.S. Department of State) with some forecasts of $135 per barrel.

Those of us who seek to influence a rapprochement within public policy between efficiency and the so-called larger goals have not so much forgotten the atmosphere or preconditions that led to the NEP as we have failed to formulate a confident and unequivocal countervision of the atmosphere that would lead to a switch to a more efficient energy policy. This failure is not surprising, however, given that the nature of the new world some of us now perceive is highly disputed and, in many ways, less appealing than the world we contemplated in the late 1970s. It is certainly not a vision most leaders would be likely to acknowledge publicly — at least not at the moment. Nonetheless, I think that recognition of the new realities is the *sine qua non* of engineering major, as opposed to incremental, energy policy changes in the near future.

To illustrate my point, consider the following conditions that influenced the formulation of the NEP:

- Cheap money and, in some periods, capital that even had a negative real cost.
- Continuing and rapid real increases in commodity values and, therefore, Canada's term of trade.
- Growing and debilitating national malaise characterized by suspicion within the body politic.

Externally, the malaise appeared as Canadians became more anti-U.S. than pro-Canadian. Internally, the rampant growth of regionalism within Canada erupted in economic civil wars. Canadians exhibited an antipathy toward "them", which I define as a fear of the unknown, or of the future, or of the outside world of the mysterious multinationals. Bluntly stated, it was a subclinical paranoia encouraged by those with a vested interest in internalizing policymaking.

Without these and other manifestations, there could not have been a National Energy Program. Indeed, given these conditions, the converse holds true as well, that a market-driven energy policy could not have been sustained. By way of support for this assertion, I would cite the reaction to the rather clumsy policies toward Petro-Canada adopted by the Clark government and the ease with which it was possible for the Trudeau government to drum up support for the misconceived policy of oil, as opposed to energy, self-sufficiency. Some of the emotional issues raised during this period have evaporated or diminished. Others, I submit, endure, permanently woven into the public consciousness.

I suggest that the natural gas fiascos of the 1970s provide a telling example. First, the problem of a domestic surplus was assuaged by a large export contract. Next, rapid price increases materialized, and it became necessary to develop plans for domestic prorationing. Coincidentally, considerable emotion was invested in preserving native lands in the North from "despoliation" by a vast multinational pipeline project. The compromise solution merely bought time, minimized the economic and financial costs of the project's ultimate collapse, and caused further puzzlement among Canadians about the state of our economic relations with the United States. I also fear that consumer subsidies for Canadians living in a so-called harsh and cold climate, subsidies to shield consumers from nominal — much less real — energy price increases, now form a permanent part of our political mythology as the reasonable thing, as the fair thing, as the *Canadian* thing to do.

Such an approach is neither efficient nor, ultimately, equitable. The terms of trade are changing and our national focus has shifted perceptibly from energy to trade and manufacturing issues. The notion that we must work with rather than against or without the United States on a multilateral, if not a bilateral, basis is gaining considerable currency, and is one which I find encouraging. In a world in which "those who cannot remember the past are doomed to repeat it," to quote George Santayana, we appear to be a nation of slow learners. But not, I submit, incapable of learning.

We must recognize that in all probability, if not certainty, we are in a new economic phase. We should be in a position to address the new realities and make the necessary realignments. Permit me, by way of a series of assertions, to illustrate the point.

First, we are entering an era in which a comprehensive restocking of our physical capital infrastructure has become, with jobs and manpower training, the priority of economic policy. It is time to secure our position in a new international industrial configuration. The challenge of technological change has never been greater.

Second, the real cost of capital will remain high, in secular terms, at least until 1990. This is due not simply to government deficits or to uncertainties surrounding inflation, but also to the great demands for capital in a new environment. Professor Adelman's view is that the upper limit for oil price increases until 1995 may be only 3.4 percent, compounded annually in nominal terms.[2] We can be assured that the real cost of capital for debt and equity will be considerably higher than those nominal price increases. There are obvious implications for Canadian energy and export policy, as alluded to by Professor Waverman. Somehow, someone must find the courage and the skill to explain this change to the public.

Third, public recognition is growing that governments, whatever they may be good at forecasting, are not good at forecasting deficits, interest rates, inflation rates, or energy prices. We need better mechanisms for considering policy changes before responding to the impact of exogenous events on our economy. Specifying these mechanisms and how they might be introduced, however, constitutes a formidable challenge.

Canadians may share an attachment to certain myths, but they also share several more positive assumptions about energy and the role of government. Those who seek to implement change in energy policy would be wise to acknowledge these assumptions. First, the federal government should be in a position to gather what rents are available and to distribute them sensibly between itself and the producing provinces. Second, energy is too important to be exempt from careful government scrutiny. Third, as a nation we cannot afford untoward reliance on outside sources to meet our energy consumption needs. Exploration in the frontier regions, therefore, must be encouraged as a long-term hedge. Finally, the energy industry should not be characterized by a growing foreign presence but rather by steadily, if slowly, increasing Canadian ownership.

[2][See M.A. Adelman, "The International Context, in this volume. — Eds.].

If we are to achieve a legitimate consensus, one where both hands are clapping, we must be sure that the changes that occur in Canadian energy policy take the view of all interested parties into consideration. The alternative would be more of the rancor and discord that have characterized the energy debate in Canada in recent years. Our best chance will be one that affords us the opportunity to say that the National Energy Program is dead, but long live a national energy program.

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